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Volume 17 July 1948 Number 7

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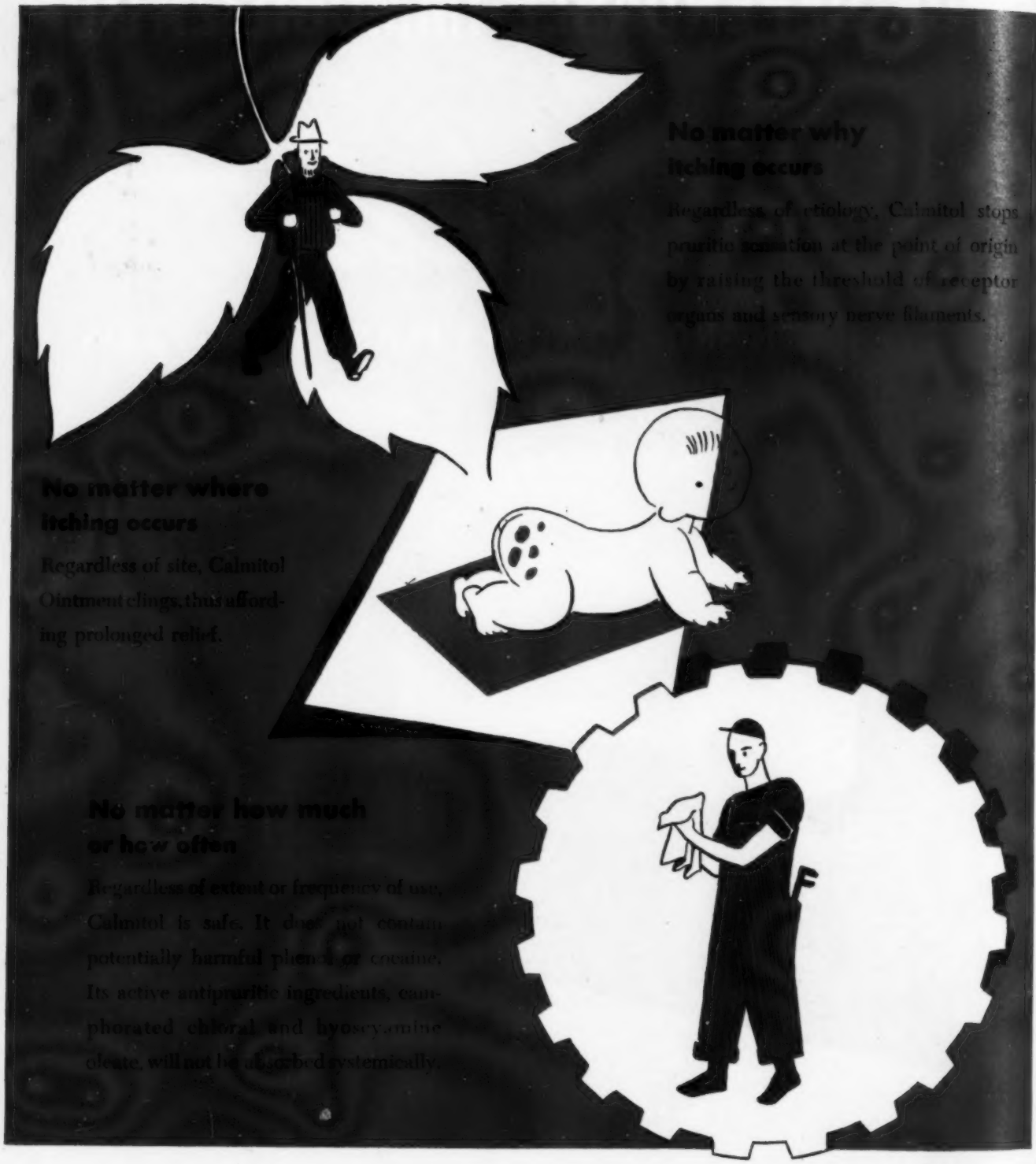
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This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited. The editors will exercise care in checking on the accuracy of data printed but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same in the current or any subsequent issues as they may be inclined.

Volume 17 JULY 1948 *Number 7*

CONTENTS

TWO CHLORINATED TERTIARY AMINES
(Diethyl-β-Chloroethyl Amine and Dimethyl-β-Chloroethyl Amine)
R. M. Watrous, M.D., J. K. Martins, M.D., and H. N. Schulz, B.S. 237

SURGERY OF THE LARGE BOWEL
Karl A. Meyer, M.D. 242

THE FEASIBILITY OF GROUP AUDIOMETRY
Cecil K. Myers, B.S., J. Donald Harris, Ph.D., and Edmund P. Fowler, Jr., M.D. 245

IMPORTANT USES OF INDUSTRIAL VISION TESTS AND THE MEDICAL DIRECTOR
W. Gregory Morgan, M.P.H., M.D., and N. Frank Stump, M.A., Ph.D. 253

THE RELATIONSHIP OF NEURALGIA AND REFERRED PAIN TO HERNIA COMPENSABILITY—CONCERNING A FREQUENT CAUSE OF DIAGNOSTIC ERROR
Frederick W. Slobe, M.D., F.A.C.S. 259

A NEW DEVELOPMENT IN ANTIHISTAMINIC THERAPY
Edward F. Roberts, M.D. 263

PREVENTION OF SILICOSIS IN THE STEEL INDUSTRY
Edward M. Feiman, M.D. 266

ASSOCIATION NEWS 267
Report of the Workmen's Compensation Committee to the Officers and Board of Directors of the American Association of Industrial Physicians and Surgeons, Boston, April 1, 1948 268

NEWS, COMMENT AND OPINION 274

EDITORIAL 277

INDUSTRIAL HEALTH AND DISEASE 20

PERSONAL 4

DR. PILGRIM 21

(ADVERTISERS' INDEX ..... 23)

[NOTE: The opinions expressed in the editorials of this Journal are not to be considered as necessarily representing the opinions of any associated organizations.]

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NEWS

DR. K. C. CHARRON has been appointed to the industrial health division of the Department of National Health and Welfare in Canada. He was formerly adviser on industrial medicine and hygiene to the government of Tanganyika in East Africa.

DR. E. P. LUONGO, Medical Director of the General Petroleum Corporation, Los Angeles, has been named a director of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. The Western Association, a component society of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, is composed of physicians engaged in occupational medicine in California, Oregon, Washington, Nevada, Idaho, Utah and Arizona.

DR. W. IRVING CLARK, Medical Director of Norton Company, Worcester, Massachusetts, retired July 1, 1948, after 37 years with the company. For many

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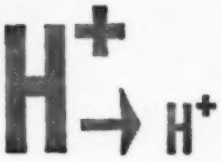

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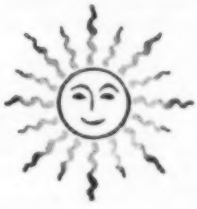

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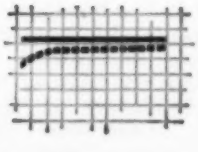

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a director of the Massachusetts Hospital Service. He is also a member of the American Antiquarian Society, and a trustee of the Worcester Art Museum. During World War I, he went overseas with the Red Cross as a lieutenant, 1917 to 1918, and served as a captain in the Medical Corps, U. S. Army, 1918 to 1919. He is the author of several books and articles, including "Health Service in Industry" (1922) and "Industrial Medicine" (1935). He also has contributed sections on industrial medicine to the Oxford Loose Leaf Medicine and the Nelson Loose Leaf Medicine, and to several medical journals. DR. CLARK will be succeeded by DR. KARL T. BENEDICT who, for the last several years, has been a part-time staff physician, and who will now devote full time to the company. DR. BENEDICT graduated from Tufts Medical School in 1936 and entered the employ of the Norton Company on a part-time basis in 1940. He is a Fellow of the American Medical Association, a member of both the Worcester and Massachusetts Medical Societies, and a director of the NEW ENGLAND CONFERENCE OF INDUSTRIAL PHYSICIANS AND SURGEONS. He lives with his wife and four children at 111 Worcester Street, West Boylston.

PHYSICIANS desiring employment or seeking new opportunities may contact the Secretary of the AMA Council on Industrial Health, 535 North Dearborn Street, Chicago 10, Illinois. Business firms and organizations desiring the services of qualified physicians for service in industry are also aided. Employment assistance is strictly on a non-fee service basis, with the Council acting merely as a clearing house for employment questions.

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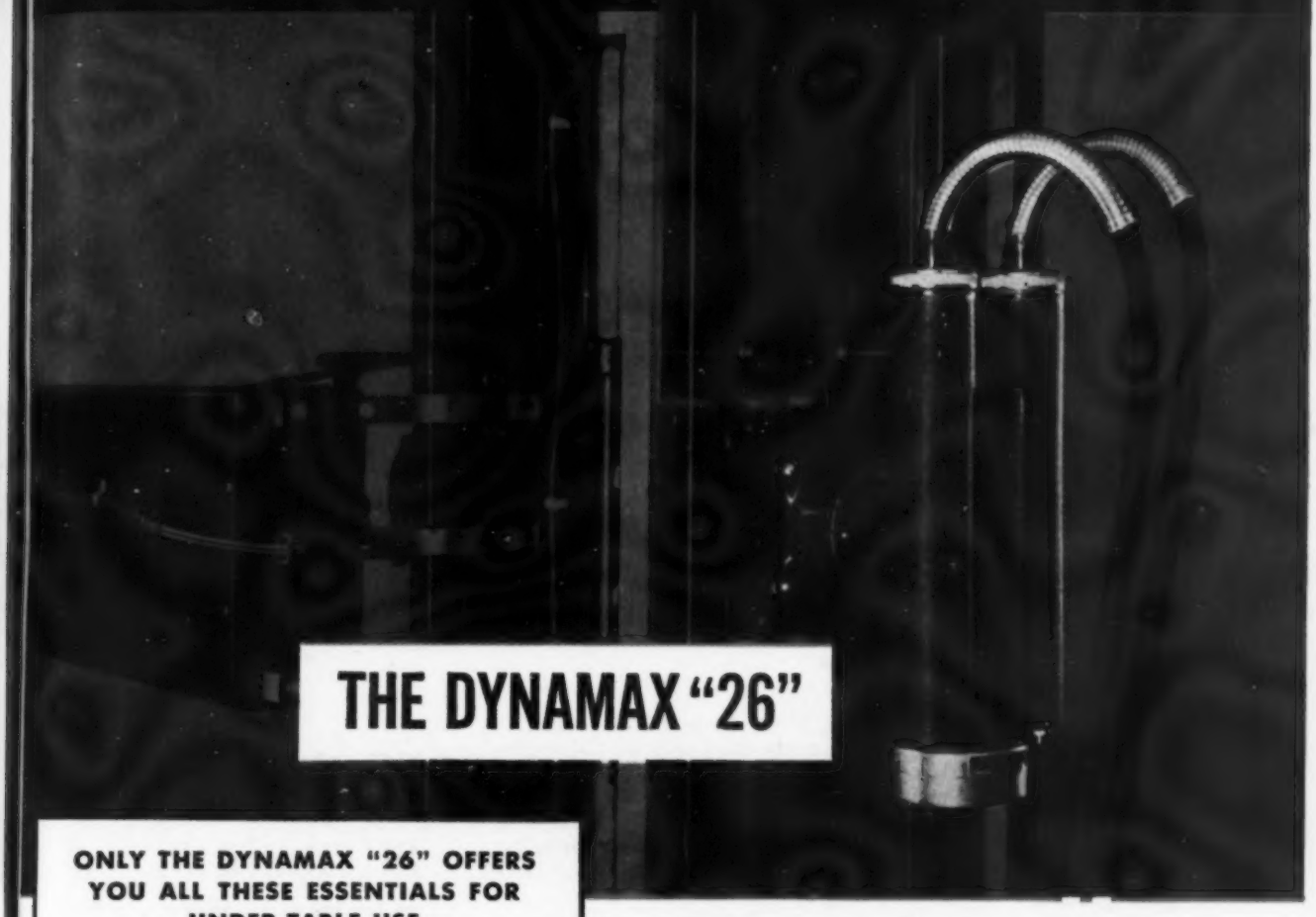

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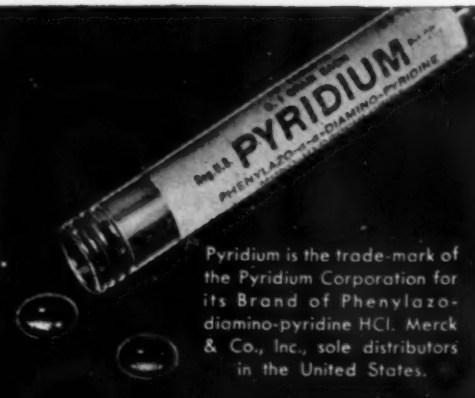

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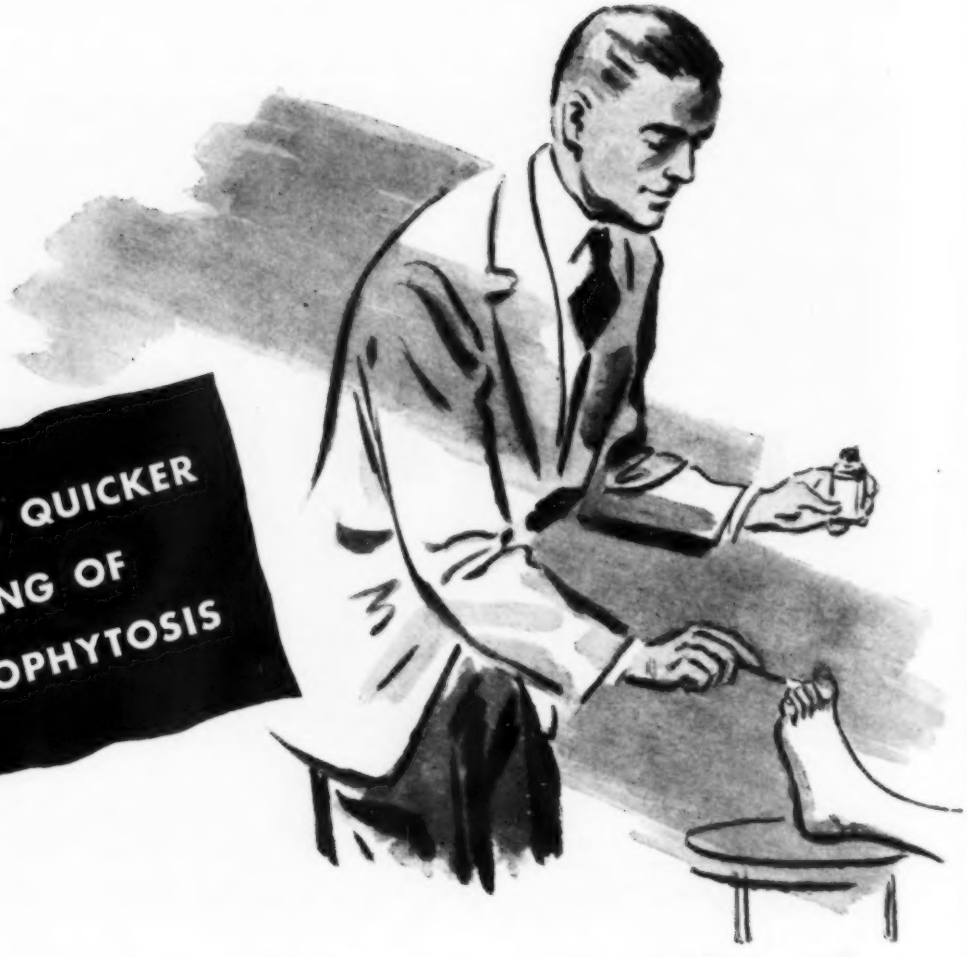

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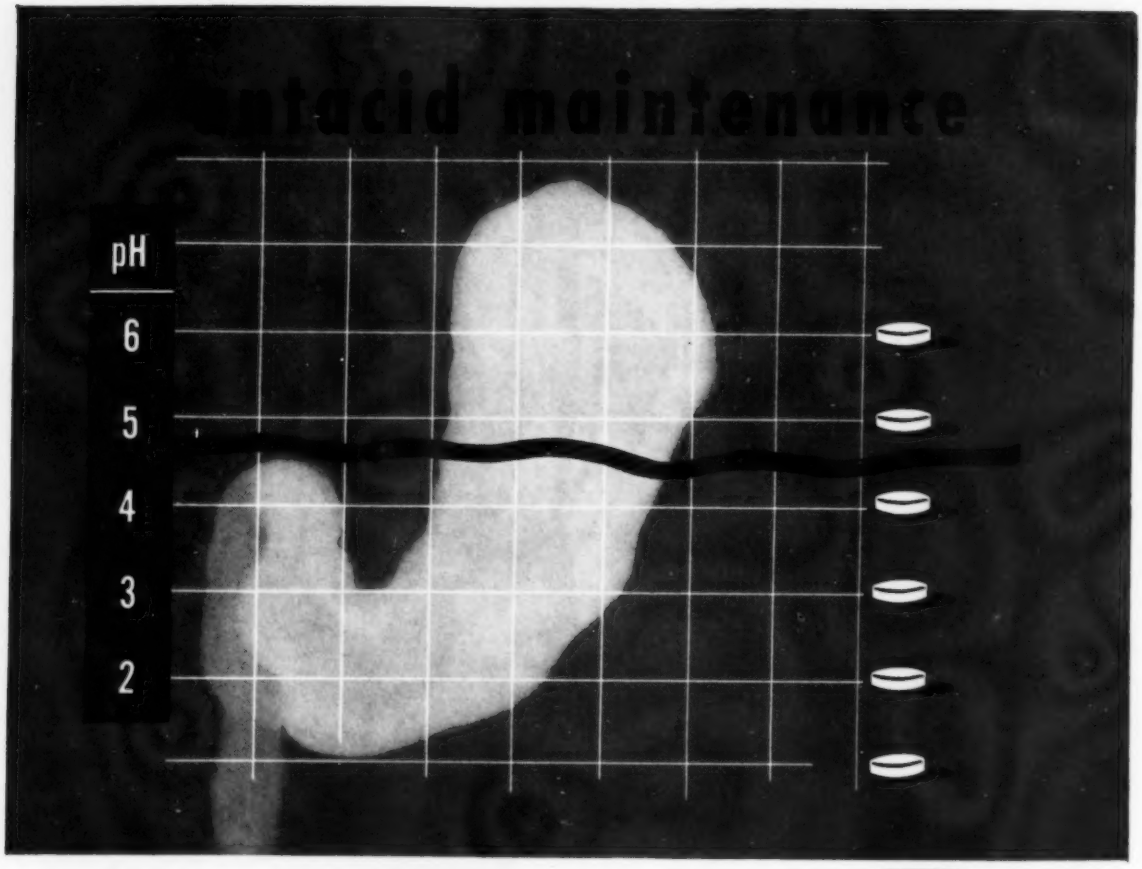

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INDUSTRIAL MEDICINE

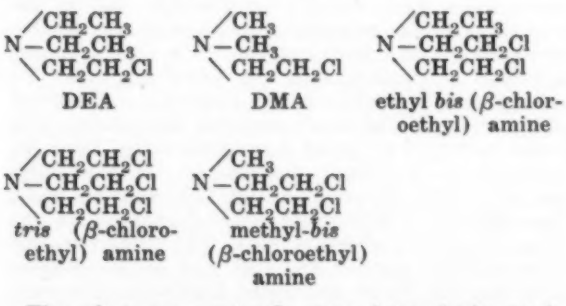
Volume 17 JULY 1948 *Number 7*

Two Chlorinated Tertiary Amines (Diethyl-β-Chloroethyl Amine and Dimethyl-β-Chloroethyl Amine)
—Toxicity in Industrial Use—

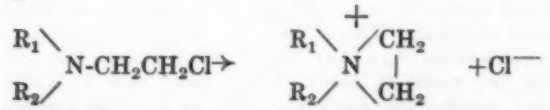
R. M. WATROUS, M.D., J. K. MARTINS, M.D., and H. N. SCHULZ, B.S.,
From the Plant Physician's Department, Abbott Laboratories,
North Chicago, Illinois

TERTIARY alkyl amines have become industrially important in recent years because of their increasing use as side-chains in synthetic drugs. Two antimalarials, quinacrine dihydrochloride (Atabrine) and Chloroquine, and the antispasmodic Amethone contain the triethylamine group. Five antihistamines, Thenylene, Benadryl, Antergan, Neo-antergan and Pyribenzamine contain the dimethylethylamine group. In the synthesis of each of these compounds, it is necessary to chlorinate one ethyl group in order to render the amine sufficiently active to combine with the other fraction of the drug molecule. The resultant β-chloroethyl amines are toxic, and may injure chemical operators if suitable precautions are not taken.

Diethyl-β-chloroethyl amine (DEA) and dimethyl-β-chloroethyl amine (DMA) are closely related to the nitrogen mustards, as may be seen by comparing the structural formulas:



The nitrogen mustards were intensively studied during the war, but much of the knowledge thus acquired is either "classified" or still awaiting publication. Gilman and Philips,[1] however, state that the essential toxic configuration is the two-carbon chain of the ethyl group with chlorine attached at one end and nitrogen at the other. In the presence of water, chloride ion is liberated, permitting a ring formation in which the beta carbon is linked with the amino nitrogen.



This labile ring is very active toward many enzyme systems vital to the living cell. It would therefore be expected that the nitrogen mustards, containing two or three of these β-chloroethyl groups, would be more toxic than DMA or DEA, which contain only one. Anslow and his co-workers[2] state that at least two of these groups are necessary to produce the selective destruction of lymphocytes which is characteristic of the nitrogen mustards, and which has caused them to receive so much attention as therapeutic agents. Our experience bears this out.

Toxicity in Animals

DEA: Anslow and his co-workers[2] give the following values for the L.D. 50 of DEA hydrochloride in experimental animals:

Mice, intravenously: 100 mg./kg.
Mice, subcutaneously: 100
Rabbits, intravenously: 40-100

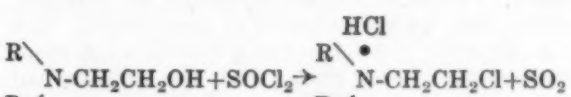
DMA: Richards[3] made a rough determination of the toxicity of DMA hydrochloride, given intravenously to mice, with the following results:

Dose, MG./kg.	Mice injected	Mice died	Symptoms
100	2	2	Not observed.
150	2	1	Ataxia, clonic convulsion.
200	2	0	Ataxia, labored respiration.
250	2	1	Ataxia, clonic convulsion, labored respiration.
300	2	1	Tremors.
350	4	2	Tremors, clonic convulsion, labored respiration.
400	3	3	Clonic convulsion.

A dose of 30 mg., given intravenously to a rabbit, did not produce any dilation of the pupils within one hour.

Exposure during Manufacture

THE hydrochlorides of DEA and DMA are obtained by treating the corresponding aminoethanols with thionyl chloride:



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These hydrochlorides are solids of low vapor pressure, insoluble in fat solvents, and have not caused any toxic manifestations, even when handled in the form of dry powder. Two measurements made during such handling of DMA hydrochloride indicated air levels of 2.0 and 3.7 micrograms per liter. Fairly effective exhaust ventilation is used during this operation, however.

The hydrochlorides must be converted to free amines just before their use in the organic synthesis, and this operation has given rise to all the toxic symptoms we have observed. The conversion is accomplished by treating the hydrochloride with strong caustic soda solutions in the presence of benzol. The free amine separates out as an oil and is taken up by the benzol phase. The aqueous phase is discarded after further extraction, but contains enough of the free amine to constitute a problem.

DMA: In the case of DMA, the free amine for the first commercial lot was prepared by shoveling the solid hydrochloride into the open manhole of a still containing caustic soda solution. Pilot plant experience had not indicated that this would be particularly hazardous, and at this time the Industrial Hygiene Laboratory had not developed a test sufficiently sensitive to measure the exposures. The operator who did the shoveling became nauseated and began to vomit within 1½ hours, and within 3½ hours was too ill to continue work, and was hospitalized (Case 1). Another operator (Case 2), who was standing about three feet from the still during the reaction, became nauseated immediately, and began to vomit two hours later. He finished his shift but was too ill to work the next day. A third operator, working about 20 feet from the still, also became nauseated and vomited, and was too ill to work the next day (Case 3). A fourth operator, who took over after the main reaction had been completed, also became nauseated and vomited after about four hours, but was able to work the next day, though he felt very ill (Case 4).

Some estimate of the degree of exposure was obtained later, after a suitable test had been developed, by measuring the concentration of amine vapor just inside the closed manhole of the still, at a comparable time during the process. Values of 18.5 and 10.5 mg. per liter were obtained in two successive tests. Allowing for the fact that the amine vapor was heavier than air, and that the manhole was about waist high, Case 1 probably came in contact with a concentration of 5 to 2.5 mg. per liter on the clothing covering the skin of his lower abdomen. This was sufficient to cause marked irritation and swelling of the skin, which ulcerated at some points. The concentration at his breathing level is much more conjectural. Tests made after the process had been modified showed that the characteristic odor of the amine could be readily detected at a level of 15 micrograms per liter, but at this concentration there was no irritation of the eyes or mucous membranes of the nose. At a level of 46 micrograms per liter, the odor was pronounced, and 30 minutes exposure caused a slight nausea without vomiting. From this, it may be conjectured that the air levels at the time of the first exposure varied from 50 to possibly 500 or more micrograms per liter. We believe that 25 micrograms per liter (5.7 p.p.m.) is the maximum tolerable concentration for eight hours.

DEA: The only toxic effect we have observed from DEA occurred several years ago in the development laboratory, and no means were available for determining the concentration of the amine in the air. DEA has a much more pronounced irritant effect on the eyes and mucous membranes of the nose, but the full extent of the damage is not apparent for eight to 12 hours. In this single case, the operator was not ill enough to require medical care until about six hours after he left work: during that time, he noticed progressive irritation and swelling of the conjunctiva and nasal mucous membranes, with increasing dyspnea. He was hospitalized with signs of mild pulmonary edema, marked conjunctivitis and rhinitis, but recovered in a few days, with no residual damage. Because of the incident, great care was used in planning the handling of commercial batches of DEA, and no further cases of exposure occurred.

Case Histories

CASE 1: A white man, 32 years of age, complained of vomiting and weakness. His pre-placement examination had revealed no physical defects except that he was underweight. At 9:00 A.M. he began adding DMA hydrochloride to a still, and was standing in contact with the open manhole. He noted a sense of refrigeration about the mid-portion of the body. He became nauseated immediately and began to vomit at 10:30 A.M. Two hours later, he reported to the plant dispensary. At that time his pulse was 58, regular and full, and his blood pressure was 118/70, with some fluctuation in the force of individual heart beats. At 2:30 P.M., his pulse was 88, regular and full, and his blood pressure was 118/70. It was noted that his pupils were widely dilated and did not respond to light. A sample of urine obtained at this time showed no albumin or acetone. The patient was sent home, where he was examined the following day.

At that time, his main complaint was tiredness of the eyes, and weakness and dizziness on rising. The eyes showed marked palpebral and bulbar conjunctivitis, with no involvement of the cornea. The pupils were dilated, and reacted sluggishly to light. There was considerable photophobia. The ophthalmoscope revealed no further damage to the eye. His pulse was 69, regular and full, and his blood pressure was 118/63. The lungs and heart were normal. There was no deep tenderness in the abdomen; the liver border could not be felt. Below the waist on the abdomen there was an erythema resembling sunburn. The penis was swollen, but not tender, and had ecchymotic spots on its shaft. Yellow purulent material could be stripped from the urethra, with some serous fluid. The scro-

TABLE I.
TABULATION OF BLOOD COUNTS BEFORE AND AFTER EXPOSURE TO DMA ON 9-10-47

Case	Date	WBC Thous.	RBC millions	Hemoglobin	Neutrophiles Young	Neutrophiles Mature	Eosinophiles	Basophiles	Lymphocytes	Monocytes
1.	7-31-47	7.45	4.96	18.0 Gm.	6	54	3	0	31	6
	9-11-47	6.90	5.01	—	5	64	0	0	11	20
	9-16-47	8.20	—	—	13	54	0	0	32	0
	10-20-47	7.05	4.79	14.5	3	59	2	0	30	6
	1-27-48	9.05	4.86	15.0	9	66	8	0	12	5
2.	7-30-47	7.35	4.44	13.5	10	60	2	0	23	5
	9-23-47	8.95	4.03	14.0	4	72	1	0	15	8
	11-24-47	7.55	4.89	14.5	2	51	1	0	35	11
	2-19-48	7.20	4.53	16.3	3	70	1	1	18	7
3.	5-27-47	8.70	4.81	15.0	3	55	10	2	27	3
	10- 9-47	9.65	4.86	13.0	3	55	7	0	29	6
	1-29-48	7.85	4.44	13.5	3	66	1	0	23	7
4.	6-23-47	9.95	5.04	14.5	1	58	7	0	22	12
	9-26-47	12.2	4.74	14.0	7	62	4	0	23	6
	12-18-47	9.2	5.63	17.0	4	62	7	0	23	4

tum was markedly swollen and tense, but not tender. The patient was hospitalized, and seen by a urologist.

In the hospital, his blood count showed no leukopenia or anemia, but there were 11% lymphocytes and 20% monocytes. No albumin, sugar or bile was found in the urine. The blood N.P.N. was 33 mg. per 100 cc. The pus from the urethra showed many gram-positive cocci in pairs and clusters, but no gram-negative diplococci. The bromsulfphthalein liver function test was normal.

The patient was treated by elevating and applying ice packs to the genitalia. The edema subsided, but he developed ulcers on the shaft of the penis which required a month to heal. He was released from the hospital on the fifth day. The dilation of the pupils lasted about five days and then gradually disappeared. No after-effects have been observed. The blood count at the time of discharge from the hospital showed no abnormality.

CASE 2: A white man, 26 years of age, was seen two days after exposure. His complaint at that time was pain in the throat and difficulty in breathing. He said he had stood about three feet from the open still during the reaction. Immediately after smelling the amine, he became nauseated, and two hours later began to vomit. Emesis lasted two hours. Eight hours later, he noticed he was unable to focus his eyes.

When examined, the pulse was 80, the blood pressure 180/82. Both eyes were red and watering and sensitive to light. The ophthalmoscope showed no further damage to the eyes. The pupils were dilated, and reacted poorly to light. The lungs, chest and abdomen were normal. The skin on the inside of both thighs was reddened; there was slight swelling in the penis. The mydriasis subsided in four to five days, the penile swelling in two days. A blood-count taken 13 days after the exposure showed a slight anemia, no leukopenia. There were 15% lymphocytes and 8% monocytes.

CASE 3: A man of mixed race, 31 years old, complained of nausea and vomiting. He had no defects on pre-placement examination except moderate bilateral decrease in hearing. He said he was working about 20 feet from the still where the DMA was being made. He became nauseated immediately, and later began to vomit. Emesis continued until mid-afternoon. Cursory examination revealed injection of both conjunctival sacs, and a thready pulse. The patient went home. The next day, he reported that the sun had blinded him while he was driving home, and "everything went black." Further examination revealed moderate injection of the conjunctiva, and extreme photophobia. The pupils were widely dilated and did not react to light. The pulse was 80, regular and full. The blood pressure was 118/78. The lungs and heart were normal. There was slight mid-epigastric tenderness, and the skin had a yellow pallor. The urine showed no albumin or sugar. Photophobia and dilation of the pupils were still present after five days, but then disappeared. On the third day after exposure, this patient stated he had a severe frontal headache, followed by a profuse nosebleed, which terminated the headache. Blood counts taken after exposure showed no change from the patient's usual hemogram.

CASE 4: A white man, 33 years of age, was the foreman in charge of the operation. Pre-placement and subsequent physical examinations had revealed no abnormalities. He took over the process at noon, after the other operators became ill, but had been in proximity to it from the beginning. He was requested to come for exmination at 4 P.M., and at that time his pulse was 80, regular and full. His pupils were dilated, but reacted to light. He said he had become nauseated and vomited once. He returned to work the next day, but appeared ill; he had a striking yellow pallor. A blood count taken 16 days after the exposure revealed no change from his usual hemogram. Urine samples obtained on the day of exposure and the day afterward showed no albumin, sugar, or abnormal pigmentation.

Discussion

THESE two chlorinated amines demonstrate vesicant properties, as might be expected. In addition, DMA has two powerful effects which seem to indicate activity on the central nervous system. The very prolonged dilation of the pupils is not a generalized sympathomimetic effect, since the most severe exposure failed to produce any effect on the circulatory system. By the same token, the nausea and vomiting cannot be regarded as part of a generalized parasympathomimetic reaction. The nitrogen mustards produce vomiting in dogs because of a selective fixation in the mucous membranes of the gastro-

intestinal tract, but this vomiting is accompanied by violent diarrhea, and there is extensive necrosis of the lining of the gut.[4] DMA does not produce this effect, and we consider the vomiting to be of central origin.

Determination of DEA and DMA in Air

THE tests commonly used for tertiary amines were found to be inadequate for determining the small amounts of DMA in our exposures. Of them all, the micro-Kjeldahl, capable of detecting 10 micrograms of nitrogen, seemed the most sensitive. Its use on one set of air samples, however, showed it to be inadequate. After considerable search through the literature, we noticed a method for testing the freshness of sea-fish, described by Dyer.[5] In this test, trimethylamine was measured colorimetrically by a reaction with picric acid in chloroform. The specific procedure for a modified form of this reaction suitable for determination of DMA, DEA, dimethylaminoethanol, diethylaminoethanol, and their hydrochlorides, is described in another section. A standard Mine Safety Appliance Co. all-glass midget impinger, with fritted glass bubbler, was found suitable for collecting the samples, if an air flow of one to 1.5 liters per minute was maintained for 10 minutes. The collecting medium was 0.5 normal HCl. The efficiency of this collection system was tested by placing weighed amounts of DMA hydrochloride in side-arm test-tubes, adding caustic to liberate the free amine, and passing air through the test-tube and then through the impinger bottle. The air stream flowed at the rate of 1.3 liters per minute for 10 minutes. At the end of this time, two analyses were made on the contents of each impinger bottle, with the following results:

mg. added	mg. found 1st aliquot	mg. found 2nd aliquot	mean % recovered both aliquots
0.2	0.20	0.20	100
1.0	0.98	1.00	99
4.0	3.96	3.90	97.5
5.0	4.95	5.00	97.5
6.0	6.00	5.90	98
25.0			
50.0	49.50	49.00	98.5
		Mean:	98.9%

The method has been found to be reliable in detecting as little as 1-2 micrograms per liter, provided the total air sample is 10 to 15 liters.

Chemical Method

REAGENTS:

Hydrochloric Acid, 0.5 N (approx.):
Reagent grade HCl, (sp. gr. 1.178-1.188): 23.5 ml.
Distilled water, to make: 500.0 ml.

2. *Potassium Carbonate, 50%:*
Potassium carbonate, C.P.: 50 gm.
Distilled water, to make: 100 ml.

3. *Picric Acid in Chloroform, 0.1%:*
Reagent grade picric acid: 0.500 gm.
Chloroform, U.S.P., to make 500 ml.

4. *Standard Solution, DMA:*
Dimethyl-β-chloroethyl amine hydrochloride: 0.200 gm.
0.5 N hydrochloric acid solution, to make: 100.0 ml.

APPARATUS:

M.S.A. Midget Impinger, with all-glass flasks, equipped with fritted glass bubbler.

2. Photoelectric colorimeter, (Klett-Summerson type was used for our work) with filter having maximum transmission at 420 millimicrons.

PROCEDURE:

Collect the sample in 10.0 ml. of 0.5 N HCl solution, bubbling the air at one to 1.5 liters per minute for 10 minutes.

2. Pipette 5.0 ml. of the collected sample into a 25-ml. glass-stoppered graduated cylinder. Add 10.0 ml. reagent grade benzene, followed by 2.0 ml. of potassium carbonate solution. Extract the amine by shaking 100 times. Allow the contents to settle until the layers are sharply defined and the benzene layer is water-clear (2-3 minutes).

3. Pipette 5.0 ml. of picric acid, 0.1% solution into a colorimeter tube. Add 5.0 ml. of the benzene layer from the cylinder, and mix by inverting several times. A yellow color forms immediately when amine is present. This color is very stable, but should be read within 30 minutes to minimize errors due to evaporation.

4. Determine the intensity of the color with the colorimeter. Estimate the amount of amine from a previously prepared standard curve.

This procedure is applicable when the amount of DMA hydrochloride in the measured aliquot is not greater than 0.5 mg. (1.0 mg. in the entire sample). At values higher than this, a smaller aliquot should be taken from the remaining benzene layer in the graduated cylinder, and should be made up to a volume of 5.0 ml. with reagent grade benzene, treated with picric acid solution as before, and measured colorimetrically.

The yellow color will be produced by primary, secondary and tertiary aliphatic amines, aniline and ammonia. Therefore, these substances will interfere with the test if they are present. Tests made with common solvents, including methanol, ethanol, acetone, butanone, halogenated hydrocarbons, toluol, benzol, ethyl ether and amyl acetate demonstrated that these substances do not interfere with the color reaction. Urea, aminoacetic acid and sulfanilamide do not interfere, but urine contains unidentified interfering substances.

To prepare the standard curve for DMA, pipette 5.0 ml. of the standard solution into a 25-ml. glass-stoppered graduated cylinder. Add 10.0 ml. reagent grade benzene, followed by 2.0 ml. of potassium carbonate solution. Extract by shaking 100 times and allow the layers to separate. Pipette 5.0 ml. of the benzene layer into a 50-ml. volumetric flask, and fill up to the mark with reagent grade benzene. Mix. Each ml. of this solution (the "working solution") contains the

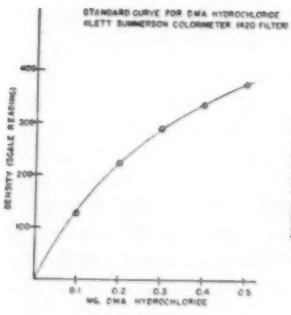
STANDARD CURVE FOR DMA HYDROCHLORIDE
KLETT SUMMERSON COLORIMETER #420 FILTER
DENSITY (SCALE READING)
MG. DMA HYDROCHLORIDE

Fig. 1.

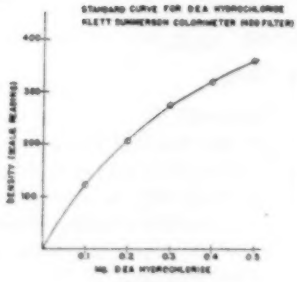
STANDARD CURVE FOR DEA HYDROCHLORIDE
KLETT SUMMERSON COLORIMETER #420 FILTER
DENSITY (SCALE READING)
MG. DEA HYDROCHLORIDE

Fig. 2.

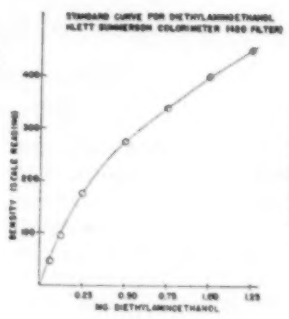

Fig. 3.

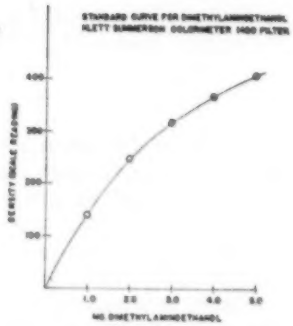

Fig. 4.

equivalent of 0.1 mg. of DMA hydrochloride, or 0.0747 mg. of the free amine. Into each of five colorimeter tubes, pipette 5.0 ml. of picric acid, 0.1% solution. Add 1.0, 2.0, 3.0, 4.0 and 5.0 ml. of the working solution to the five tubes respectively. Bring the total volume in each tube to 10.0 ml. by adding reagent-grade benzene. Mix the contents of each tube, and read the color.

A standard curve for the 0-0.5 mg. range for DMA hydrochloride is shown in Fig. 1. Similar curves for DEA hydrochloride, diethylaminoethanol and dimethylaminoethanol are shown in Figs. 2, 3 and 4.

Summary

INDUSTRIAL exposure to DEA vapor caused severe irritation of the mucous membranes of the eyes, nose and throat. Mild pulmonary edema occurred.

2. Industrial exposure to DMA vapor at levels estimated to be between 50 and 500 micrograms per liter caused immediate nausea, followed after some hours by vomiting and very prolonged dilation of the pupils. There was no effect on the circulatory system, and no detectable destruction of leukocytes. Levels estimated at 5 mg. per liter had an irritant and necrotizing effect on intact skin. Four case reports are presented.

3. We tentatively suggest that levels of DMA above 25 micrograms per liter (5.7 p.p.m.) would cause toxic symptoms if breathed for eight hours.

4. Similarities and differences with respect to the nitrogen mustards are discussed.

5. A color-reaction with 0.1% picric acid in chloroform is described, by means of which air levels as low as 1-2 micrograms per liter can be determined on 10-liter samples.

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Better Off Sharing than Doing Without

THERE are ways of teaming up with other employers to get better medicine instead of loading all the overhead of a good program on one small company's budget. Many plants are beginning to discover these ways and put them to work. Through employer-backed groups or foundations, through medical schools and societies, through industrial nurses' organizations, through union health and welfare funds, smaller companies are competing with their better-heeled big neighbors in efficiency of their medical dollar. . . .Best plan is a good industrial doctor of your own and full-time nurses and attendants. But if you're not big enough, you are better off sharing them than doing without them.

—From "Medical Programs for Industry," condensed from *Modern Industry* in *Advertisers Digest*, June, 1948.

Surgery of the Large Bowel

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LESIONS of the colon are an extremely fascinating subject today because, with modern surgery and modern preparation of the patient, there can be a very low mortality if we can have a very low morbidity—something we could not have 10 years ago.

These lesions are readily curable even with local metastasis and infiltration into some of the surrounding viscera. There are various factors, however, that we must realize: first, the importance of an early diagnosis; also, the importance of a definite method of approach in making a diagnosis.

Examination

WE should consider that all patients with definite abdominal troubles and distress, whether it is pain together with a loss of weight or an anemia, should be prepared with a rectal examination, which means a digital examination; second, a proctologic examination with a proctoscope; third, a biopsy of any pathology that is found; fourth, a barium enema, an air contrast barium study; and lastly only, a gastro-intestinal x-ray from above.

That may seem like a strange statement to make—that is, to begin at the rectal end in making our diagnosis instead of starting with the gastric approach. The reason for this is undoubtedly familiar to most abdominal surgeons; it is the possibility of precipitating an acute intestinal obstruction of the large bowel by giving barium orally.

Too often many roentgenologists are not cognizant of this fact, or they ignore the very serious catastrophe that can happen to a patient with a carcinoma, especially one of the left half of the colon or rectosigmoid.

It is most important to know the number of cases that can be diagnosed alone by digital examination. Over 50% of patients with carcinoma of the colon and carcinoma of the rectum are palpable by digital examination, and 20% in the rectosigmoid and in the sigmoid area lend themselves to proctoscopic examination. So, in well over 70% of cases, the lesion can be felt or seen. That is an exceedingly interesting observation and one that should be well considered.

The portion of the lower sigmoid to the rectum is a blind area and x-ray examination is of little worth until obstruction occurs, and by that time the patient is usually inoperable. This means that every patient should have both a digital examination and proctoscopic examination. Very few of us, until we have had our eyes opened so many times, carry out this routine in each case.

Presented before the Association of Surgeons of the Pennsylvania Railroad and the AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Tuesday, November 25, 1947.

Diagnosis

IF WE have a lesion of the colon, the next question is, what is the nature of the lesion? What can actually occur in the colon that would produce an ulcerative condition, an obstruction, or a pronounced anemia, and not infrequently an acute anemia?

Lesions of the left half of the colon and rectosigmoid have a distinct tendency to produce obstruction because they usually are the single drainage type adenocarcinomas. Lesions on the right half of the colon are most often ulcerative and produce symptoms of anemia, loss of weight, and at times symptoms of a colicky nature, and so are generally diagnosed as chronic appendicitis or chronic gall-bladder disease.

Lesions of the colon should be considered anatomically, pathologically and physiologically in respect to location—lesions of the right half of the colon or lesions of the left half of the colon.

There is practically no argument among surgeons as to the treatment of lesions of the right half of the colon. Exteriorization operations are out unless there is a long history of disease and intestinal cramps showing obstructive phenomena, and in obstructions of the right half of the colon a great many are already inoperable.

But when we find symptoms of chronic appendicitis or chronic gall-bladder disease and also have an anemia present, we must consider the possibility and the probability of a slight lesion of the colon—usually an adenocarcinoma of an ulcerative type.

In all unexplained anemias one should consider three conditions: a carcinoma of the right half of the bowel; carcinoma of the stomach; or a pernicious anemia. If these are kept in mind we will make few mistakes.

If a lesion of the right half of the bowel produces a severe anemia is there frequently a severe hemorrhage in these lesions? No, that usually is not a pronounced symptom—frank hemorrhage is more pronounced in lesions of the left half of the colon. But the anemia is undoubtedly due to an absorptive phenomena and toxemia from absorption, producing a minimum amount of hemorrhage.

Percentages of cure of patients who are operable, for lesions of the right half of the colon are: a 60% five-year cure with a resection when glands are not present; and a 40% five-year cure even with the presence of glands.

The diagnosis is practically always assured by two studies: One is a thorough examination of the colon after it has been thoroughly emptied: the contrast diagnosis with air in the colon is a very important factor in those patients who have persistent blood in the stools. Any patient, with persistent blood in the stools and ulcerative lesions, is most often a case of carcinoma.

Operative Procedure

CARCINOMA of the right half of the colon lends itself to one stage procedure, a one stage resection. This diagnosis is most important from the patient's standpoint. The location of the lesions makes no difference whether an ileocecal carcinoma, a carcinoma of the descending colon, or a carcinoma of the hepatic flexure of the colon, the operation is always the same. We do a hemicolectomy on all lesions of the right half of the bowel.

We do not have to consider any anatomical structures or variation in technic in a resection in this portion of the bowel.

Whether the resection is an end to end anastomosis of the ileum to the transverse colon or a lateral anastomosis, is of little importance. An end to end anastomosis possibly has an easier convalescence and more normal peristalsis, but if the operation is properly done both should have a low mortality and low morbidity.

Factors in Safety

PREPARATION: In all cases of carcinoma of the colon the patient must be properly prepared. It takes a week to 10 days or two weeks to make a patient safe for the surgical removal of a segment of the colon or a hemicolectomy. The first thing to consider is whether we have a protein deficiency—every patient with a carcinoma is more or less deficient in protein upon examination. We do not think of operating on a patient who has, say, a protein of five or five and a half or even six gm. to 100 cc. of blood. This is very important in our operation and in our preparation.

The quickest way to prepare a patient with protein is to put in 100 grams of protein per day, orally if possible for convenience and lower cost.

Another method is the use of amino acids intravenously. With the products today we do not fear any reactions from the intermediate amino acids.

In our cases with a low protein deficiency, the most rapid approach is with frequent blood transfusions—a minimum of four to every patient before a resection of the colon. Remember this fact, that every blood transfusion of 500 cc. will raise the hemoglobin by 10%. Consequently, if a patient has a hemoglobin of 50%, he will receive at least four transfusions and maybe five. With a protein deficiency usually anemia is present, but with the four or five transfusions the anemia is taken care of simultaneously.

Plasma is of little importance in the treatment of patients unless for shock treatment after the operation or where there are difficulties with the Rh factor, etc.

Again, we must realize that these patients are older individuals, and we have to know if there are complicating diseases. Especially important are urological complications because sometimes it may be necessary to correct this before attempting to do a resection.

With all these points concerning the preparation—control of the protein deficiency, control of the protein anemia with a minimum of four blood transfusions, control of avitaminosis, which is frequently present, use of amino acids—it makes no difference what the age of the patient is, whether he is 50 years of age or 40, or 80. There is no contra-indication to operation in the age limits today.

ANESTHESIA is another thing that made these operations safe. In the younger individual, we routinely use a spinal anesthetic for better control of the patient. It does not have the deleterious influences that general anesthesia has on all organs—such as the liver, kidney, etc.—and I think it has definitely lowered our mortality.

The method of abdominal approach is through a right paramedian incision. We can use a transverse incision in certain instances, especially if the lesion is of the hepatic flexure of the colon. In dealing with an iliocecal lesion, we can very well use the oblique incision of Kocher.

SULFA DRUGS also lowered the mortality and morbidity. With a week's preparation with sulfasuxidine in rather large doses—three grams every four or six hours, day and night—we are operating a patient with a minimum of bacterial count in the gastro-intestinal tract.

Postoperative, we continue the sulfasuxidine because it is relatively a laxative and keeps the bowels open.

CLOSURE OF THE ABDOMEN is of immense importance in all abdominal work. So important that I will digress a moment to state that I do not believe continuous catgut should ever be used in the abdominal wall. Use interrupted sutures of finest suture material, if one is using a catgut technic. But it is preferable to use non-absorbable suture material in the closure of the abdominal wall.

We follow the Austin teaching and have for many years. Fine interrupted silk on the peritoneum, the use of silk or wire on the fascia and silk on the skin, lessens the chance of post-operative evisceration which is still the "bugbear" of colon surgery. Evisceration is present in at least two to 5% of the cases with catgut closure of the abdomen.

I am reminded of the story that Tom Jones of Cleveland tells—how he lowered his mortality by following advice given to him by Babcock of Philadelphia. By changing from catgut to the use of silk and interrupted sutures, he lowered his mortality from 10 to 6%. Then Babcock stated, "you will lower your mortality by using wire."

Thus he changed to the steel wire and lowered his mortality to 2% in his abdominal peritoneal resections without any change in technic. That can occur in everyone's practice if they follow this teaching of Babcock and of Jones and many other surgeons.

Disadvantages of Exteriorization

We have entirely discarded the exteriorization operations in lesions of the left half of the colon. These patients are prepared with the same care as those with lesions of the right half of the colon. They are given sulfasuxidine, four blood transfusions, amino acids, the use of spinal anesthesia, and the same closure.

Lesions of the left half of the colon have a distinct tendency to produce obstruction. Thirty per cent of the patients with lesions of the rectosigmoid in the County Hospital come in obstructed. They must be diagnosed relatively early, but, in this aged group no abdominal exploration should be made.

It has been our observation in a large group that patients do better with a colostomy of the transverse colon than with the cecostomy which is usually done. The mortality is distinctly less and the results are much happier with the use of a transverse colostomy.

The mortality of lesions of the colon with exteriorization operations today is around seven to 10%. The mortality with an immediate resection is around two to 4%, and without the prolonged convalescence.

Conclusions

I bring you the important point that all lesions of a non-obstructive character in the left half of the colon, transverse colon, and sigmoid, can be done in a one stage procedure—without prolonged hospitalization that occurred in the past with exteriorization; with much higher chances of a five-year cure; much less chance of postoperative ventral hernias which, in repair, had a higher mortality than gastric resections or abdominal peritoneal resections. In other words, repair of ventral hernias has higher morbidity and mortality than the original resection.

Again, we have the chance of a five-year cure in at least 50% of our patients with early operation; and the chance of a 40% cure with lesions that have glandular metastasis.

A word of caution—I believe the tendency has been and is increasing to try to save the sphincters in lesions of the ampulla of the rectum. A study of the work of Gilchrist and David shows that 23% of these recur. Therefore we should not temporize with striving to save the sphincters in lesions of the ampulla below the peritoneal fold of the rectosigmoid.

This tendency is being brought forward more often. I myself have been guilty of doing these resections, but I am reverting to the original teaching of Mills and the cautionary measures that he recommended just before his recent death. If we go back to the original abdominal peritoneal of Mills, in lesions of the rectosigmoid and ampulla, we will have a much higher percentage of cures and a lower percentage of recurrences in the ampulla than when we temporize in an operation that should be the most radical we could perform.

Everybody's Getting Into the Act

From Leonard Lyon's column in *Bronx Home News:* "Mrs. Elise Beauchamp, Garden Editor of the *New Orleans Times Picayune*, is avoiding friends, because she's suffering from an occupational disease—poison ivy infection".... From *Pittsburgh Press:* "They've discovered that the easiest way to get out of stir is to stir up a case of stomach ulcers. It seems the County feels it's a little 'too difficult' to retain behind bars the unfortunate inmates who can't retain the food served there. The County would rather heave out the ulcer victims on parole. Since the word has gotten around, ulcers are fast developing into an occupational disease among such folks as morals offenders, relief chiselers and numbers writers"....From *New York Herald Tribune*, May 12: "Janney suspects he has an ulcer, and he quite definitely has 'radio stomach' (chronic heartburn), the occupational disease of radio actors"....From *New York Herald Tribune*, June 13: "American soldiers who spend too much time practicing the art of elbow-bending are becoming the victims of an occupational disease. Medical officers said the elbows of soldiers who frequent Japanese saloons are breaking out in a rash, caused by lacquer painted on the bars. Many of the better Japanese bars are coated with a lacquer containing the chemical urushiol, they explained. Leaning against them does something to American elbows. In fact, they said, 60 to 80% of Americans break out with 'a rash like the effects of poison' when they get near the chemical. The Japanese funnybone apparently is immune to the stuff."

The Feasibility of Group Audiometry

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THE problem of detecting hearing losses among large numbers of individuals is of great importance in several fields, notably in school systems, in industry, and in the military services. The ideal goal would be to detect as early as possible every individual with hearing impairment, give him adequate medical care and, if the hearing loss shows a tendency to increase or is permanent, give him an educational program suited to his needs, together with sufficient social and vocational guidance or rehabilitation so as to make possible for him his most effective way of living.

Unfortunately, only a few states have programs approaching this goal, and these programs have been instituted relatively recently. The situation is improving rapidly, especially with the interest the services have taken in aural rehabilitation; but it remains true that at present most of the people in this country have never had any accurate estimate made of possible hearing impairment.

That aural impairment does exist in such prevalence as to be a serious medical and even medicolegal problem, has been shown by every hearing survey made. The National Health Survey, 1935-36, questioned 800,000 families involving 2,800,000 persons, and performed audiometric tests on 8,310 persons, a sample representing the whole population.[1] Of these 8,310 persons, 56.1% reported no noticeable aural difficulty, and 43.9% reported some difficulty—nearly half the population with some impairment. But even if we count only those persons in whom both ears were reported unable to understand speech originating at a distance of two or three feet directly in front (excluding assistance from lip reading), the survey notes 10.6% of the whole population, or nearly 15,000,000 persons at present in this country, may be extremely handicapped socially and vocationally.

An estimate is given by Steinberg, Montgomery, and Gardner[2] of the percentage of the whole population which has a hearing loss of 25 decibels or more for frequencies used in speech reception. At this level, hearing loss begins to be a social handicap. From results culled from 35,589 tests, these authors estimate somewhere between four and 12% of all the population sustain loss of 25 decibels or more at the frequencies 440, 880, and 1760 cycles per second (cps). At best, several millions of aurally defective people are estimated.

Something is being done in decreasing the prevalence of hearing impairment in children, especially with the use of radium in the nasopharynx; yet, over the whole country, this is really only a drop in the bucket. Walter[3] estimates that "12,000 young men and women each year enter the occupational world handicapped by moderate or severe hearing impairment. This figure does not include the large number of older persons who become hard of hearing during their later working years." He states that 15% of the cases on the rolls of the Pennsylvania State Rehabilitation Service are deaf or hard of hearing.

It has been emphasized repeatedly elsewhere[4,5,6] that hearing impairment is or should be a matter of concern to industry. The consensus is that, as a first step, accurate hearing tests should be given to anyone who may be subjected to appreciable amounts of noise.

If there is general agreement that hearing tests should be administered to large sections of the population, the question arises of what test to administer.

Auditory ability is not a unitary trait, but rather is composed of a number of specific abilities. That is to say, an individual may not be able to detect changes in loudness very well, but is able to detect changes in pitch with remarkable skill. Or he may be able to appreciate slight differences in rhythm, but be unable to hear speech at weak intensities. Not one test of hearing, but a whole battery of tests, must be given to describe thoroughly the status of an individual's hearing.

There is, however, one auditory trait, namely, the ability to hear weak sounds (usually known as auditory acuity) which is of first importance in many life situations. If there is anything we do *not* want to miss, it is something whispered into the ear! From a clinical point of view, moreover, a measure of acuity is the best single guide to the present and future functional status of the auditory mechanism. In their examination of hearing ability, otologists have concerned themselves almost exclusively with acuity measures. All tests which use distance or time of sound decay, including almost all common clinical tests, are measures of auditory acuity. One may conclude that a good test of acuity would provide the most useful single measure of how well a person hears.

The classic tests of acuity are the whispered and spoken voice, watch tick, and tuning fork tests. All of these are fraught with inherent inaccuracy and have been superseded among careful workers by other tests using modern

electronic principles. The case against the older tests has been made by many researchers and will not be labored here. Of course, it is still contended in certain circles that the classic tests are sufficient; but denying to the otologist the possibility of truly accurate hearing tests with equipment now commercially available is like depriving the cardiologist of the EKG, simply because it is expensive and time-consuming.

Because of the characteristics of the ear itself, however, a good test of acuity is not a simple thing. An ear may respond normally to low tones but be partially or completely deaf for higher tones. An ear may be partially deaf to a certain tone but be normal for tones either higher or lower in frequency. A large number of such atypical patterns can be found. Some of them are particularly disabling, others are of great importance in medical diagnosis and prognosis. In any hearing survey which hopes to achieve precision and usefulness, acuity must be measured at a variety of frequencies in the audible range, preferably at octaves from at least 200 cps up to eight or 10,000 cps.

The commercially available instrument for producing tones of the purity and intensity required is known as the audiometer. One pure tone at a time is presented by headphone to a single subject. The weakest intensity which he can hear is then found. The difference in decibels (db) between that intensity and the intensity at which a normal-hearing subject can just hear that tone, is a measure of the hearing loss of the subject *for that tone.* Another tone is then selected for testing; and so on. A standard technique must be followed.[7] A graph, known as the audiogram, relates hearing loss on the vertical to log frequency on the horizontal ordinate, and constitutes a quick accurate picture of the functional status of the subject's acuity throughout the audible range. No examination of an ear can be said to be complete without at least a six-octave audiogram.

There are occasions when it is advisable to limit the range of frequencies tested, as when it is desired only to know the acuity for speech. In this case it is usually better to use a phonograph audiometer and substitute actual speech instead of pure tones; equipment and directions are readily available.[8] Where audiograms are available, they can usually be interpreted with considerable accuracy in terms of how well speech can be heard[9,10]—though, to be sure, there are clinical types of hearing impairment for which this correspondence does not completely hold.[11]

The problem for the industrial physician is, however, broader than one of speech reception. Hearing impairment may occur which nevertheless leaves speech reception unchanged—that is to say, speech reception tests will not reveal the impairment. Diagnosis and prognosis are facilitated more by audition than by a speech reception score alone. And there are further advantages of the audiogram, such as the fact that its medicolegal status has been secured by the recognition of the American Medical Association.

Grove[12] summarizes the argument as follows: "Compensation claims increase in periods of depression and in periods of mass layoffs. Until there is closer cooperation between the industrial physician and the otologist and until a careful pre-employment audiometric examination is made in every worker who may be subjected to excessive noise, we will not be able to separate the true from the false, the wheat from the chaff. Many workers will receive compensation for a defect which is in no way connected with his occupation, or only partially so. And, vice versa, many a worker whose hearing has been seriously damaged by his occupation will have doubt cast upon his claim .... my plea to otologists, to industrial physicians, to industry, and to insurance carriers is that an accurate pre-employment audiometric examination of the hearing of every worker be made by one qualified to make such an examination and under conditions that are relatively comparable."

Testing Time by Usual Audiometric Methods

PURE tone audiometry is ideally conducted by an experienced audiologist in a thoroughly soundproof room, using a calibrated audiometer, and testing one individual at a time. And, in fact, any departure from these recommendations may allow error to creep in. The only possible objections are that the process is expensive, particularly the providing of soundproof space, and that it is time-consuming. The fastest time per man possible is about 4.5 minutes; this is for an audiologist working all day with intelligent, cooperative adults, all normal or nearly normal in acuity.[9] With a difficult subject, who may need masking, bone conduction testing, and checks for malingering or psychic deafness, an hour or more can easily be consumed. With large numbers to be tested, this expenditure of time becomes quite unwieldy.

For the difficult subject it is probable that no modification of audiometry can ever be justified. In some cases it simply takes times to establish the necessary rapport between tester and patient; in other cases, more elaborate techniques must be used. Nevertheless, there are several ways in which individual standard audiometry can be modified in the direction of economy of time, ways which are quite satisfactory for certain specific purposes.

If all that is wanted, for example, is assurance that the subject can hear all frequencies at a certain intensity, let us say 15 db worse than the normal threshold, it is quite sufficient to set the volume control at 15 db, and simply sweep the frequency dial from low through high tones, interrupting the tone occasionally to check malingering.[13] If the subject hears the tone all the while it is actually on, his hearing is at least as good as the volume control reads. This technique is well adapted to screening certain groups, such as service personnel. It will pick out any individual who needs more detailed individual exam-

ination. A nearly normal population can thus be screened at the 10 db level in an average of one minute and 38 seconds per man.

The sweep technique is deficient, however, in that it does not label the ears accurately, but merely throws them into pass or fail categories. Moreover, it burdens the testing program with many cases of individual audiometry in the fail group. For most situations, a technique would be preferable if an accurate and complete audiogram could be quickly drawn for each man.

It is the purpose of the present paper to describe the degree of success attained in a program of group hearing testing, in which complete six-octave audiograms were provided for each subject at an expenditure of time and personnel far below that demanded by individual audiometry. and without great consequent loss in precision.

History of Group Pure Tone Audiometry

GROUP audiometry with the use of pure tones was apparently first investigated by Munson,[14,15] who demonstrated that a group test of acuity, with self-recorded responses, could be made simple enough to eliminate nearly all administrative and scoring errors. He compared the average hearing loss and standard deviations at each of six octaves, using standard individual procedure, and again using a group procedure. In the latter, the subjects recorded how many brief spurts of tone they heard at lower and lower intensity levels.

The differences in acuity as measured by the individual and by the group method are presented in Table I. The differences, ranging from 5.47 to 14.7 db, are appreciable, and are due to the technique, not to differences in output of the individual vs. the group phones. This was shown by the fact that when the group testing equipment was used, but with standard individual procedure, on eight ears the difference in mean acuity was never more than 3.5 db. In both experiments the sizes of the standard deviations were practically the same.

TABLE I.
VALIDITY OF FIRST ATTEMPT AT GROUP AUDIOMETRY
(From Munson[14])

33 Ears Cycles Per Second	Group Minus Individual Mean Acuity in Decibels
256	5.47
512	9.42
1024	12.55
2048	14.7
4096	14.7
8192	8.15

Munson further made a comparison of the standard deviations of the distributions containing the deviations of a second test from a first individual test. In the first procedure, the second test was an individual retest; in the second procedure, the second test was a group test. Presumably any increase in the standard deviation of differences in the second experiment as compared with the first, reflects a lowered precision of the group test.

The results are in Table II. There is a loss of precision of from .9 to 4.0 db as a consequence of the group method.

TABLE II.
STANDARD DEVIATIONS OF DIFFERENCES BETWEEN A FIRST AND A SECOND AUDIOMETRIC TEST
(From Munson[14])

	Cycles Per Second					
Procedure 1	256	512	1024	2048	4096	8192
Test 1: Individual Test						
N=38	3.5	4.3	4.0	4.3	5.9	9.8
Test 2: Individual Re-Test						
Procedure 2						
Test 1: Individual Test						
N=33	6.9	5.3	4.9	7.9	9.9	12.3
Test 2: Group Test						

On the basis of Munson's work, group pure tone audiometry was made available at the 1939 World's Fair.[2] Tones in spurts of one, two, or three were generated by phonograph and presented by earphone at intensity steps decreasing by 10, eight, or six db from well above to well below normal threshold. At each intensity step the subjects were required to write down the number of spurts heard at that step. Five octaves, from 440 through 7040 cps, were tested. The equipment was calibrated by acceptable methods, and results are generally held to represent properly the hearing efficiency of the Fair population. A one-booth duplicate of this self-service system is at present in use at the Franklin Institute in Philadelphia.

In 1942 E. G. Wever[16] connected six unmatched phones to a Western Electric 2A audiometer, testing 36 subjects at four octaves from 512 to 4096 cps. The reliability coefficients for the group procedure, as well as for test-retest using group equipment but with standard individual procedure, were all around +0.80. He does not state whether some frequencies were more reliable than others, nor did he prepare validation data relating results on the group test to results from the same ears with the individual procedure and equipment.

Based on the work of Munson, a spurt technique was utilized by Harris[17] in a routine military situation. General efficiency was good; reliability was about as good as careful individual audiometry. Validity (in terms of how closely the group data approximated individual data from the same subjects) was satisfactory. Table III gives mean acuity and standard deviations for each procedure, on the same subjects. The small differences between mean acuities, ranging from .35 to 3.85 db, indicate no strong tendency for group data to be different from individual data. If there were, for example, a tendency on the group test to miss the last one or two intensity settings which would be heard on an individual test, such a tendency would appear in Table III. But as a matter of fact the group test means run somewhat better at three of the six frequencies.

Neither is there a tendency on the part of the group test standard deviations to be larger.

There is no strong tendency, making for variability, inherent in the group and not in the individual method.

TABLE III.
COMPARISON OF THE MANNER IN WHICH THE TWO TESTS DISTRIBUTE A POPULATION (From Harris[17])

Cycles Per Second	Indiv. Mean Acuity Loss in db	Group Mean Acuity Loss in db	Difference	Individual Standard Deviation	Group Standard Deviation
256	7.00	6.15	.85	3.75	5.70
512	1.95	2.30	.35	3.80	5.20
1024	.90	−2.95	3.85	5.80	5.00
2048	1.15	4.95	3.80	7.70	7.05
4096	10.50	9.35	1.15	13.85	14.20
8192	6.60	10.15	3.55	15.50	13.90

Harris further studied how widely an individual's group score may be expected to deviate from his individual score. Table IV gives the mean deviations of group-from-individual-scores for 290 subjects. For comparison are included the mean deviations of group-from-group scores for 72 subjects. The deviations of group-from-individual scores may be regarded as expressing validity of the group technique employed. Harris concludes, "Since the deviations from group-to-individual test are only slightly greater than the deviations from group-to-group test, it seems to make little difference whether a second test is given individually or by groups. Inasmuch as we do not usually look for a higher validity statistic than the reliability of the less reliable test, these validities are probably satisfactory."

It must be noted that these data are applicable only to highly selected subjects—young, healthy men with normal or near-normal hearing and at least average or better intelligence. It seemed likely that the method would apply to other groups, but this remained to be seen.

TABLE IV.
MEAN DEVIATION OF FIRST TEST SCORE FROM SECOND TEST SCORE (From Harris[17])

Cycles Per Second	Group vs. Individual (Validity)	Group vs. Group (Reliability)	Difference
256	4.45	3.80	.65
512	3.80	3.35	.65
1024	3.65	2.05	1.60
2048	4.25	3.85	.40
4096	5.70	5.10	.60
8192	6.15	5.40	.75

It is interesting to note that the pulsing-tone method has had considerable success with young children, both individually[18] and in groups.[19] It has also been used with college freshmen[20] and with routine clinic patients.[19] For the latter most difficult group, with 15 headphones and testing seven octaves up to 80 db loss, 45 minutes is needed—three minutes per patient.

In view of these studies, it seemed quite probable that the extremely economical group technique could be utilized with all types of subjects except, of course, those unable to follow simple directions because of severe deafness, low intelligence, language difficulties, or the like. If so, an important new tool would have been added to the armamentarium of the school, industrial, and military physician.

Conditions of the Present Survey

IN RESPONSE to a request from the Veterans' Administration for an estimate of the types and degree of hearing impairment among exservicemen, the authors agreed to provide complete audiometry on a large number of veteran enrollees at Sampson College, Geneva, N.Y. The purpose was two-fold: first, to investigate the feasibility of group audiometry in a civilian adult population, and second, if the first were possible, to provide data from which the VA and others could draw a number of practical conclusions about the prevalence of hearing impairment in our young male population.

POPULATION: The subjects of this study were 1448 young men, enrollees in a junior college, all veterans of the recent war. The median age was 22.07 years. Their motivation appeared excellent. They were invited by groups to participate in a hearing survey for the VA. No other inducement was given; it is thought that most of the men who could fit time into their heavy schedules did volunteer. We gratefully acknowledge their cooperation, and that of the college authorities, who assisted in every way possible.

APPARATUS: Three audiometers were used: a Western Electric 6BP coupled to 24 Permoflux PDR-8 phones in sponge rubber oval cushions which give approximately 20 db attenuation; a Western Electric 6B coupled to nine such headphones; and a Maico audiometer with air and bone conduction units for individual testing.

The phones used were matched by using a 50 cc closed coupling into a General Radio sound level meter, Type 759. Subsequent calibration of 24 of the phones used showed that the original match was satisfactory within the experimental error of threshold determination. This calibration was performed in the Medical Research Laboratory using a Ballantine six cc. artificial ear, decade amplifier, and vacuum tube voltmeter.

Matching, satisfactory for the purpose, may be accomplished, however, without the use of any equipment.[17] A careful individual audiogram is taken with each of the phones available, for each of a number of normal-hearing subjects. Mean thresholds at any frequency are compared from one phone to the next. A phone which is not close to the average may be discarded, or if the deviation is not more than a few db, appropriate correction may be added to all data from that phone for the specific frequency involved.

It is important to note that there must not be too great a mismatch between the total impedance of the phones in parallel and the output impedance of the audiometer. An impedance-matching transformer may be inserted if necessary. Any radio repairman should be able to give

advice and help materially in this matter.

When a group of headphones is coupled to an audiometer calibrated for a single receiver, the zero point for any frequency, that is, the point representing normal acuity, may no longer hold. A new zero point must be found for each frequency. This may be done by using a standard six cc artificial ear with a previously calibrated standard phone, or it may more simply be done by using a few normal subjects: For any frequency, select half-a-dozen or more subjects exactly normal by individual test (or make appropriate correction if a slight deviation exists). Then find the average intensity dial setting at threshold for these subjects when one of the group phones replaces the individual phone. This setting, then, is the new zero point for the group apparatus for that frequency. And so on for all frequencies.

The two group audiometers used here were calibrated by this latter method. The 24 phone assembly has since been calibrated in the laboratory with the artificial ear. Data by the two calibrations differ at various frequencies by from zero to 2.87 db.

Each headband was provided with a phone and a dummy wooden plug, also in an oval cushion. Testing was carried on in four ordinary rooms, two large ones for group audiometry, a small one for individual audiometry, and an office equipped for otological examination.

The rooms were in an almost unused part of the campus. The tests could easily be interrupted to allow the noise from an occasional car to pass.

A check on the calibration, noise level, and general technique is provided by the distribution of hearing loss, considered below.

TESTING PERSONNEL: Two audiometricians were provided by the VA, and one by the Medical Research Laboratory. Otological examination was performed by Dr. Paul Lindenberg, of the VA. Audiometry was under the general supervision of the first-named author. A receptionist-clerk was provided who proved indispensable. All of the testers had had months of experience and were thoroughly competent for the level of accuracy required.

TECHNIQUE: Subjects were asked to spend a half-hour in a hearing test, and were routed to the test building. They were met by a receptionist, who gave each man a pencil and questionnaire* and directed them in groups to the two test rooms. Those who knew their hearing was defective were invited to see the otologist, and have, in addition, an individual audiogram.

Once in the group testing room, subjects were seated in chairs with writing boards attached,

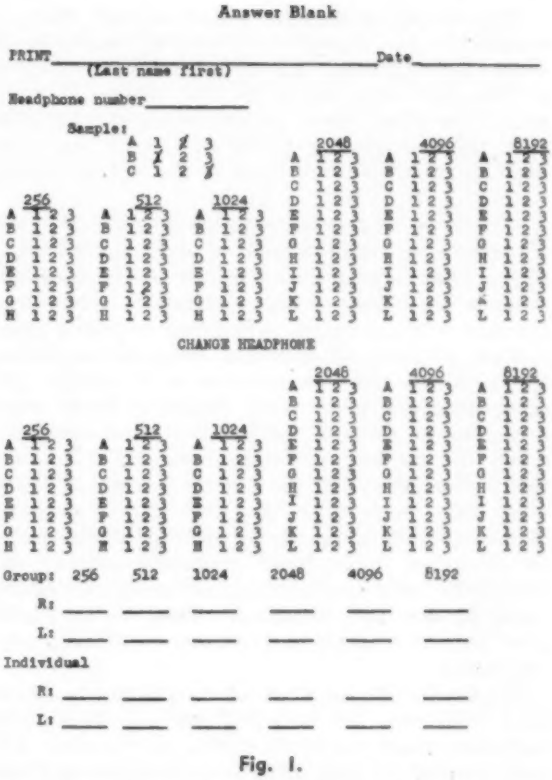

Fig. 1.

and each given an answer blank (Fig. 1). The following instructions were then given:

"You men are about to get a hearing test. Put the phone with the wires on your right ear; the other side is a dummy wooden plug." (Tester checks phones for placement.)

(Tester presents a 1024 cps tone, 50 db over zero.)

"Do you hear a loud tone in your right ear?"

"Now look at the samples on your answer blank. I will call the first letter, and then give one, two, or three short spurts of tone. You should draw an X through the number of spurts you hear. Then I will call the next letter, and so on."

"Look at the sample. Here is letter A." (Gives 1024 cps, 50 db, twice.) "You should have drawn an X through the two."

"B." (Gives 1024 cps, 40 db, once.) "You should have drawn an X through the one."

"C." (Gives 1024 cps, 30 db, three times.) "You should have drawn an X through the three."

"Do not worry if you do not hear all of these, as it is possible to have normal ears and still miss some of these items."

"Now turn to the column labeled '1024.' Here is item A. Ready?" (Gives Columns 1024, 512, 256, 2048, 4096, and 8192 cps in that order, first in right ear, then in left ear. For the three lower frequencies, the intensities were 30-20-10-5-0-5-15-25; for the three higher frequencies, the intensities were 50-40-30-20-10-5-0-5-15-25-35-45.)

After both ears had been tested, the papers were handed to the audiometrician, who looked over the sheets one by one. Threshold was taken for any frequency as the weakest intensity the subject marked correctly, provided all louder levels were correct, and provided the descending-ascending thresholds agreed within five db.

*This questionnaire was the means of obtaining an auditory history, particularly of service-incurred auditory trauma. Results from this questionnaire, largely negative, are not included in this paper. Anyone interested in a fuller account may refer to the official Navy report,[21] obtainable by addressing the Medical Research Laboratory, New London, Connecticut.

Occasionally a man turned in a sheet with irregularity of response, indicating deafness or some other trouble. All such men were directed to the individual test room and thence, if deafness were established, to the otologist. In addition, the otologist routinely saw many scores of individuals before they went to the testing rooms.

VOLUME OF TESTING: Complete audiometry was performed on 1448 men in seven full working days. This large number is due to the excellent cooperation of the college officials in scheduling the men who appeared. (The men missed a gymnasium period.) It does not, however, represent the total possible examinations of which this equipment and crew were capable. There were occasions of waiting for subjects, and occasions when the rooms were only partially filled. On the busiest day, 382 men were examined. And even this does not represent the maximum. There were 33 phones; two groups could easily be examined in an hour, including seating, instructions, practice, testing, collecting and examining papers, and dismissal. Thus, in an eight-hour day, 16 groups, or 538 men, could have been examined.

With only the number of men actually examined, however, the otologist and the individual audiometrician were sometimes too rushed. The best opinion is that with one otologist and one individual audiometer, no more than 24 group phones should be used if used to capacity.

EFFICIENCY: Thirty-nine men were given individual, but not group testing. In 11 cases this was due to irregularities of scheduling rather than to known deafness. The audiograms of the remaining 1409 men were examined to see how many were not satisfactorily tested by group procedure. There were 86.5% for whom a satisfactory audiogram was taken on a first trial; 13.5%, or 189 men were referred for individual testing. Of these 189, there were 164 men who showed loss, at one or more frequencies, greater than the group test could measure. There were, then, remaining 25 men, or 1.8%, whom it was clear the group method could have encompassed but did not. Possible explanations included earphone trouble, inattention, and unwanted noise from an occasional car, gust of wind, or footstep in the hall. Very few, if any, cases occurred of failure to understand and follow the simple directions.

We conclude that in such a population a group method is effective within a 2% error. It will provide complete audiograms for a near-normal population, and screen out for further examination all who do not fall within the limits used.

It should be added that of the 189 men referred for individual test, 40% needed a check at only one frequency (for all other frequencies the group data was satisfactory); 20% needed a check at only two frequencies. Only 7.6%, or 14 men, needed complete audiometry in both ears.

The number of men referred for individual audiometry depends, of course, upon what intensities are used in the group test. If only the level from normal through 10 db of loss is tested, for example, then anyone with loss of 15 db or more is not described, and he must be examined individually. On the other hand, if the group test is extended to cover all men, a great deal of time is lost in submitting most men unnecessarily to intensities which for them are very loud. Some compromise must always be accepted for optimum efficiency. We feel that the intensities used here were satisfactory. If the three lowest frequencies had been begun at 50 instead of 30 db, the number of men referred for individual audiometry would have been decreased by 35. But it would have taken as much testing time to cover the additional 20 db range as it took to test the 35 men individually, and in the meantime we saved each group subject about 2.5 minutes.

VALIDITY: The validity of such a survey as this depends upon two major factors, the first physical and the second psychological. The first, or physical factor, is concerned with whether the equipment, when set at zero for a certain frequency, actually delivers to the ear canal a pressure close to the minimum audible pressure.

The second, or psychological factor, is concerned with whether, supposing the equipment itself is satisfactory, the particular technique of threshold determination actually produces a threshold which is meaningful in terms of hear-

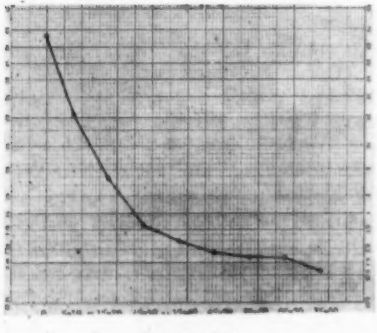

Fig. 2 (A).

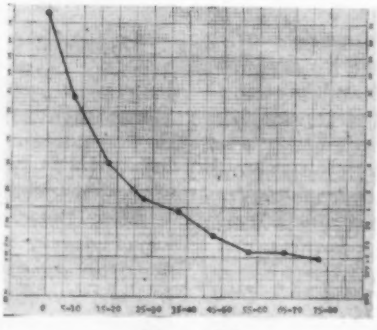

Fig. 2 (B).

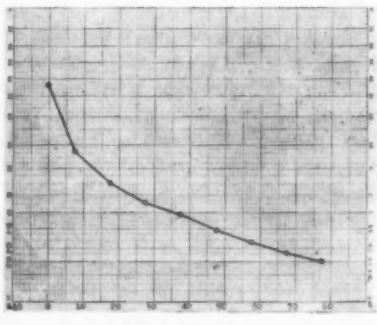

Fig. 2 (C).

Incidence of Hearing Loss
Ordinate: Percentage Worse Than Indicated Impairment; Abscissa: Hearing Loss in Decibels

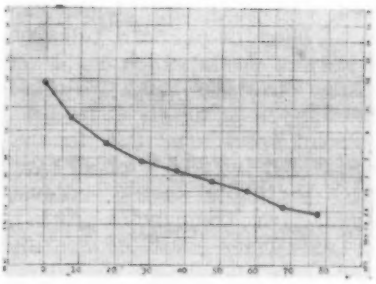

Fig. 2 (D).

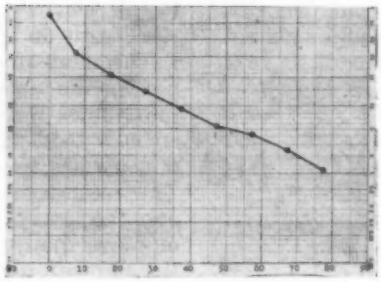

Fig. 2 (E).

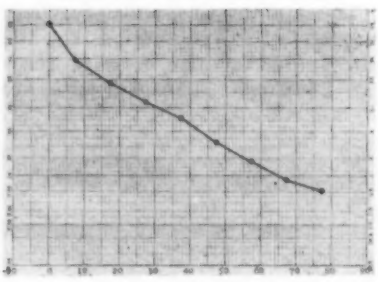

Fig. 2 (F).

Incidence of Hearing Loss
Ordinate: Percentage Worse Than Indicated Impairment; Abscissa: Hearing Loss in Decibels

ing loss. A man with a loss of 30 db, for example, would be said to have a loss of 40 db if some technique were used which did not force the subject to use his last 10 db of audition.

In this study, pressure levels in the ear canal at the stated zero settings were not available at the beginning of the survey. The zero settings were, rather, referred to the zero levels of a recently calibrated Western Electric 6B audiometer,[22] by the intermediary of an ear carefully measured on that instrument. This process will introduce error depending upon the accuracy of the 6A calibration and upon the standard errors of thresholds measured in the intermediate steps; but the total error should be a very few db.

It remains to estimate the validity of the psychological factors involved in group testing. For this purpose a comparison can be made between the present data and those of another survey for which receiver calibrations were obtained. The U. S. Public Health Survey[23] presents data using the Western Electric 2A audiometer on a population the same sex and roughly the same age as ours. Any marked deviation must be explained in terms of difference in receiver output, in methods of threshold determination, or in actual difference in acuity of the two groups.

Analysis of the data shows that by and large the two surveys agree rather well. For example, at 256 cps, the largest deviation is 11% at 5-10 db loss, partially due to the fact that in our population a larger number of men sustained greater than a 15 db loss. With regard to validating the physical and psychological factors producing on our test a score of zero loss, the important observation is that the point of central tendency is about the same as that of the earlier survey. This may be taken to mean that the receiver outputs of the two surveys were about the same (a comparison of the 2A and 6A audiometer outputs may be found in reference 22), that the present group technique reaches about the same threshold as an individual test, and that the two groups are very similar in acuity.

In this connection it should be mentioned that the hearing of the population is not completely representative of veterans as a whole. Those veterans whose hearing was severely damaged would likely be discouraged from attempting college work. This discouragement could come from one or more of several sources.

For the frequencies 512 and 1024 cps, the correspondence between the points of central tendency of our data and those of the Health Survey is as good or better than for 256. At 2048 cps, it appeared that our group test was 2-3 db easier, while for 4096 and 8192 cps the group test was 5-7 db easier. No specific reason can be assigned to these differences. It is not likely that our population was inherently more acute than the population of the previous survey—moreover, the slight differences between our psychological calibration and the later laboratory calibration are in the other direction. It is probable that the several small errors involved in our psychological calibration, all happened to cumulate in one direction rather than to cancel each other. Since more elaborate methods of output calibration are beyond the reach of the average otologist, and moreover have an error likewise, we recommend that the psychological technique be employed where the more precise methods are not possible; error will be reduced to a negligible amount by collecting enough data on known-normal ears. It is better to proceed thus than to lose the value of group testing by waiting till more elaborate equipment is at hand.

We conclude that the correspondence between our data and those collected on a similar population by the standard individual method, establishes the general validity of the group method for general civilian use, within an error little larger than that of the individual method.

ACUITY OF THE POPULATION: A quick idea of the acuity of our subjects may be obtained from Table V, which groups the men into general categories. These self-explanatory percentages can be taken as representative for the veterans of this country in college.

For those who may wish to study these data by single frequencies, we present Fig. 2, A-F, and Fig. 3. These figures are drawn on arithmetic probability paper, which has the desirable property of emphasizing small percentages (just those relatively few cases of deafness in which we are most interested). The graphs are to be read thus (see Fig. 2A): 68.2% of all 1448 men scored worse than zero at 256 cps; 22.2% scored worse than 5-10 db; 3.9% scored worse than 15-20 db; .65% scored worse than 25-30 db; and so on.

The audiograms were further examined with respect to the average loss for 4096 and 8192 cps, and again for the average loss for 512, 1024, and 2048 cps. These results are in Fig. 3.

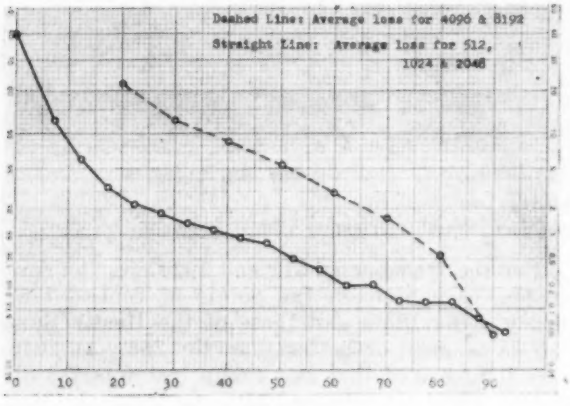

Fig. 3.
Incidence of Low Tone and of High Tone Hearing Loss
Ordinate: Percentage Worse Than Indicated Impairment;
Abscissa: Hearing Loss in Decibels

Since this paper is primarily concerned with the utility of group audiometry rather than with the acuity of our particular population as such, no further analysis is presented here. A full account, together with case histories of 44 hard-of-hearing subjects, is in the Navy archives.[21]

TABLE V.
PERCENTAGE OF MEN WITH HEARING IMPAIRMENT

NORMAL:	(1) 0-10 db at all frequencies	20.9
	(2) 15 db loss at one frequency only	12.4
INCIPIENT LOSS:	(3) 15 db loss at two or more frequencies	8.0
	(4) 0-15 loss for one or more low tones but 20 db or more loss at 4096 and 8192	29.8
	(5) 15-25 db loss at one or two low frequencies	5.2
MILD LOSS:	(6) 15-30 db loss at three or more frequencies	10.0
	(7) 15-25 loss for low tones but higher loss for 4096 and 8192	7.6
HARD OF HEARING:	(8) Loss of 30 db or more at all frequencies with both ears	0.7
	(9) Miscellaneous (unilateral deafness, distorted audiograms)	5.4
	TOTAL	100.0

Summary and Conclusions

PURE TONE audiometry should be performed on large numbers of our population. But by the standard individual testing procedure, sufficient training personnel and equipment are at present not available for the amount of testing needed.

A group pure tone audiometric technique, using equipment commercially available, has been developed which promises to substitute in some measure for the time-consuming individual procedure. Previous studies have shown the group test to be able to describe hearing with about the same precision as individual audiometry.

In this survey, complete six-octave audiograms for both ears of 1448 veteran enrollees in a junior college were obtained. A crew of five completed the survey in seven working days. With 1448 subjects, the group equipment was by no means taxed—the 33 group phones can easily test 66 men an hour, or 528 in a full day.

The number of answer sheets which could not be scored (inattention, etc.) was 1.8%. All other individuals were handled at or nearly at its peak efficiency by the group procedure. Satisfactory audiograms were provided for 86.5% of all ears. The rest were given individual testing because one frequency (40%), two frequencies (20%), or more than two frequencies exhibited hearing impairment greater than that which the group equipment was designed to test.

The average acuity of this population compares within a few decibels of that of earlier surveys on similar age and sex groups by the U. S. Public Health Service and by Bell Telephone at the 1939 World's Fair. Between two and 3% had hearing impairment at least sufficient to begin to impair social communication.

It would appear that in terms of completeness and accuracy of results, a group method of pure tone audiometry is feasible in a reasonably alert adult population.

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Important Uses of Industrial Vision Tests and the Medical Director

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VISUAL performance tests were given to the employees of the Owensboro Tube Works of General Electric Company in order to determine (1) what visual skills are related to general efficiency on various jobs; (2) how important are visual skills for inexperienced workers; (3) are visual skills essential for experienced workers; (4) how are visual skills related to various levels of earnings; (5) whether visual skills are important during the learning period; (6) whether visual skills and absenteeism are related; (7) whether measurement of visual skills should supplement methods previously used at employment for selection and placement of employees.

Some of the conclusions that can be made are:

1. The true minimum vision standards for specific jobs in the plant were determined and are being used on applicants for future employment.

2. Those employees who had lowered vision or vision that did not meet the minimum job standards were discovered, and referred for professional eye care. The benefit of this procedure to the workers and to the company is directly proportionate to the number of referrals who get professional eye care. Definite relationships were found between visual performance and hourly earnings.

3. Findings indicated that there is a definite advantage to the company for employees who meet visual standards from the standpoint of minimum make-up pay.

4. Supplementary study should be continued with other factors, such as absenteeism, age of worker, quality of production, etc., to determine their connection in visual performance.

It should be stressed that through an Industrial Vision Service the industrial medical director has many opportunities for widening his usefulness to the industrial organization. A contribution made in the industrial vision field cannot fail to give greater prestige and an increased moral and economic support to the medical department by industrial executives.

Compensation Laws Stimulated Vision Testing

ONE important purpose of the introduction of vision tests into industrial organizations was to give some control to the payment of compensation. The medical director was required to know the visual acuity of the employee to determine the visual loss, if any, produced in the event of an eye injury. If an employee were assumed to have 20/20 vision in either eye at employment and after the accident, it was discovered that he possessed only 20/200 vision in the eye injured, the industrial organization would be required to pay compensation on an 80% loss of vision in that eye.[1]

The Snellen Acuity Chart devised by HERMAN SNELLEN in 1862 presented a method for measuring visual acuity based on the principle of the minimum separation of perceptible images. This method of vision testing appeared some 20 years before the first national compensation act was passed in Germany. So, when a method for testing visual acuity for sompensation was first needed by medical directors of industrial organizations, it was expedient and natural to utilize the testing device available at the moment.

The impetus given to compensation laws coincided with the impetus given to vision. In fact, compensation was the direct aid to the stimulation of vision testing. In these early days, the universality of compensation laws meant universality of the Snellen Chart, because evaluation of visual abilities was essential before a determination of the monetary award for damages in compensation could be made.

By 1910 most countries of Europe had passed some national compensation act, participation in it being mandatory for employment. The first important compensation law was enacted by the United States Government in 1908. At least one reason delayed its passage, as compared to countries of Europe. Wages were higher here and workers could more easily than in Europe take care of illness following an accident. Irrespective of the amount of wages, experience has proved compensation laws to be an absolute necessity.

The universal use of the Snellen Chart today, 85 years after its original presentation, and its application to wider and wider areas of activity, has stimulated the construction of both visual performance tests to determine not only acuity but other visual skills proved effective for the job. In binocular tests, there are instances of the replacement of letters of the alphabet by other targets for acuity testing. Also the method of testing each eye while the other eye functions normally, rather than to block off one eye while testing the other, has contributed greatly to our present knowledge of visual performance and job success. The need of tests to determine other visual skills besides acuity, such as, muscle balance, stereopsis, and color, has been realized by medical directors and psychologists. The Snellen Chart continues to be used for diagnostic purposes, but stereoscopic performance tests are rapidly becoming an important adjunct to it in industrial organizations.

The application of vision tests to furnish facts in compensation cases was only one means of stimulating vision testing. With the introduction into industry of personnel departments and the stress on industrial relations, pre-employment and pre-placement also began to recognize vision as an important individual characteristic. At the present time, wider and wider use is being made of vision testing. Medical personnel and safety departments in industrial organizations are beginning to place more and more emphasis on this phase of their work.

Pre-Employment and Pre-Placement

THE SNELLEN tests were generally administered in the medical department of industrial organizations and the results were made a part of the records in personnel, medical, and safety departments. An applicant was often accepted or rejected in terms of his vision, determined on an arbitrary standard for the job. In fact, during World War II, when an industrial applicant fell considerably below normal vision, it was first determined whether he could be brought to normal for the job for which he was being considered. If he could not be brought up to "normal" vision, time was not lost in giving him a complete physical examination. If, however, he could be salvaged by correction or other professional services as far as his eyes were concerned, then a complete physical examination followed.

The Snellen test was almost consistently administered at a distance of 20 feet. Seldom was any near-point vision test recorded in industry.

Medical men and psychologists alike noted that many jobs in the plant were decidedly of the near-point variety. The logic of the situation began to crystallize. Applicants were being selected on the visual basis of 20 feet and yet were performing their jobs between eight and 16 inches. The problem was: Is visual performance determined at a distance of 20 feet any assurance that the applicant's vision performance is equally good at 10 inches?

The use of a fact-finding system revealed that the choice of hosiery loopers by a vision test at 20 feet did not select the best workers for visual performance at eight inches. In fact the reverse was true, those loopers with the poorest *far* vision turned out to be the best workers. Depending on age, it is easy to see that the presbyopic with very keen far vision would have difficulty performing a job at eight to 14 inches without correction.

The fact-finding approach revealed the needs for stereoscopic tests which determined visual performance at the near point as well as the distance point.

Vision Testing to Conform to the Job

OPHTHALMOLOGISTS have expressed themselves concerning the testing needs of industrial and commercial organizations. "A form of stereoscopic instrument"[2] was suggested as desirable. It is said that: "With the aid of such an instrument (stereoscopic), the screening can be done at the plant by non-medical persons who have had training in its use. Moreover, this method will save much time for the plant ophthalmologist and for employees—a most desirable feature." Such an instrument is discussed in the second half of this paper. It contains tests of essential visual functions which have been found important for success on the job. The tests are also of such a nature that visual performance standards can be set for the job by a fact-finding system.[3]

Works Physician Administering Twelve Vision Tests to an Employee of Owensboro Tube Works

Good Vision is Required for Efficient Assembly of Fine Parts—Placing Top Mica in Radio Tube Cage Building

Vision testing which stressed natural seeing skills on the job, aided the employee quite as much, if not more, than it has the employer. (a) Comfort on the job; (b) simplification of work tasks; (c) increased earnings; (d) decreased rejected materials at inspection; (e) greater safety at the job, are only a few of the benefits expressed by employees.

The sum total of visual performance testing has added up to increased employee-employer relationships. Employees are intensely interested in their eyes.[4] Periodic rechecks of visual performance have resulted in the same amount of enthusiasm from the employees as did the initial testing. Employees are interested in changes of visual performance, if any, since the first performance test. They wish to know whether their eyes are still functioning up to the visual standards set for the job or whether a referral to a professional eye man for services seems desirable.

By selecting new employees to meet the visual standards set for the specific job on the basis of *eyes for the job*, the company may expect better and more production. These employees need less training time, and therefore, less make-up pay. Fewer accidents may also be expected. It may even produce less turnover, less absenteeism, and fewer visits to first-aid, which factors experience has shown to be closely related to eye strain and eye fatigue, with all of its accompanying symptoms.

Today, visual skills are determined in applicants and in employees on the job for reasons which go far beyond the determination of the degree of loss of vision due to eye injury for compensative evaluation. The modern viewpoint aims at finer human relationships and understanding between employees and employers. The slogan, *Eyes for the Job*, is a most potent force which experience has proved to build better personnel relationships throughout the entire industrial organization.

New Avenues for the Medical Director

THE WORK'S physician of the Owensboro Tube Works of General Electric Company organized an Industrial Vision Program with employees, placing emphasis on *eyes for the job*. The following tangible findings will be of special interest to medical directors, and may offer suggestions for the further extension of their services to employees through medical departments in industry.

When such services were under consideration for Owensboro Tube Works, it was our belief that an eye testing instrument in itself was not sufficient to meet our needs. True, a testing instrument is a means to an end, but the analysis and use made of test results are also extremely important. So, the medical section was interested not only in the most scientific instrument available, which gives both reliable and valid tests, but also in a system which gives the "know-how" in handling test results. For this reason, the medical section was especially interested in the Industrial Vision Service with the Ortho-Rater.

The industrial medical director has almost unlimited opportunities "to extend his arms of service" to every part of the industrial organization through an Industrial Vision Service based on a fact-finding system. By means of a vision service to employees, the wider contributions which the medical department can make are brought to the attention of the industrial employees and their managements. The result is, added prestige to the medical department by the most reputable avenue of progress, namely service. The medical department, consequently, becomes a potent force in the solution of many industrial problems and the medical director's services are sought more and more by executives and employees of the industrial organization.

Efficient Vision is Essential for Assembly of Fine Parts—Assembling Grids in Radio Tube Cage Building

Orientation of Management and Employees

BEFORE going into a department, a meeting with top management was called and the high points of the program were explained to them. Such questions, as (1) "What are the purposes of an industrial vision service? (2) What could be expected from it by the company and by the workers?" were discussed. Mimeographed sheets were distributed to the workers the night before the tests were to be given. These sheets explained the program. The whole thing was voluntary. It is a pleasure to report that less than one half of one per cent of the employees refused the tests and those who did refuse them had what they felt was a valid reason for doing so. Experience at other companies indicates that these very persons will request to take the tests when they understood the benefits to be derived from them.

The entire plant was tested by sections. As each section was finished, the foreman was asked to rank the employees as to their production, both in quantity and quality. These ratings along

with the scores on the visual performance tests furnished the basis for the establishment of standards by the fact-finding basis.

In setting standards, definite procedures were used. First, cards were assorted according to experience on the job, which were then checked against the foreman's rating. Secondly, each of the 12 visual skills tested was analyzed and checked against the foreman's rating. The relationships were determined among all of these factors. When the statistical analysis was completed, several important facts emerged. First, a minimum visual standard was set up for each job to be used to check future employees being considered for that job. Secondly, the names and clock numbers of present employees who did not meet that visual standard were recorded so that these employees could be referred for eye care to professional eye men.

Reports to the Worker Given Major Consideration

TWO SEPARATE reports were given to the workers, one for those meeting the visual standards, and another for those employees who did not meet these standards.

A. *Those Meeting Visual Standards:* After the analysis of each section was completed, a report was made in writing to each individual tested. To those who met the standards, a printed report was given them, stating that their vision, as tested on the Ortho-Rater, met the minimum standards for their particular job.

B. *Employees Who Do Not Meet Standards:* To those who did not meet the minimum standards, a like printed report advised them of this fact and further suggested that they have an interview with the Work's physician before obtaining professional eye care.

Referral Forms and Professional Eye Men

ARRANGEMENTS were made with the foreman of each section whereby the Work's physician could interview all those employees not meeting the standards. Each employee thus interviewed was advised of the importance of conserving his eye sight, and of the importance of getting good professional eye care. At this time, he was given a referral form to be taken to the eye doctor of his choice. This form contained a replica of the minimum job standard profile on which was superimposed an exact duplicate of the worker's Ortho-Rater test scores. Thus, the eye doctor could see at a glance wherein the patient did not meet the standard pattern, and could give the needed professional eye care which would likely enable him to meet the standards.

Before any employees were referred for eye care, a series of meetings were held by the Work's physician with the ophthalmologists and optometrists in the town to which the employees would likely go for professional eye services. At these meetings the Ortho-Rater was demonstrated to the professional men, together with pertinent information concerning the job standards and the referral form. The main purpose of these meetings was to inform the eye men what we were doing at General Electric and what we wanted and expected from them in the way of eye care for those referrals. Without exception, these professional eye men were enthusiastic about the program. They have been most cooperative in all respects and always send a report to this department of their findings and of what correction they were able to make on the patients referred.

It is well to report that these patients go to ophthalmologists and optometrists of their choice. In case the employee does not have a regular doctor who takes care of his eyes, a panel of available doctors has been mimeographed from which the employee can make his own choice.

When the employee has decided which doctor he will see, the Work's physician gives him a letter of introduction, together with a general explanation of the Industrial Vision Service and the Ortho-Rater shown in Display A encouraging the professional eye man to get in touch with the medical section if any further information is desired.

DISPLAY A

Dear Doctor:

The above named individual was recently tested on the Bausch & Lomb Ortho-Rater in our plant. This instrument measures twelve visual skills that are used most frequently on industrial jobs and which have been found to have a direct bearing on job performance.

His visual performance is below the Visual Standard for this job. We have found that employees who meet the Visual Standard in all respects are more comfortable, more efficient, and less likely to have accidents on the job. We have, therefore, suggested to him that he might benefit from professional eye attention.

He has selected you as the professional man he would like to visit. Believing you would be greatly interested in his Visual Performance Profile, we have enclosed a copy of it for your reference. We have indicated by a straight line on the Profile card those scores which are not desirable for this job. The scores that this individual made on actual tests are circled. Therefore, you can readily identify the visual skills on which this individual is below the visual standards for this work. We have also indicated on the Profile the working distance at which this job is performed.

Please do not hesitate to telephone us if there is any other information you would like to have. We would appreciate a report from you.

Yours very truly,
W. G. MORGAN, M.D.,
Works' Physician

Benefits for Employees in Average Hourly Earnings

AT THE outset it should be pointed out that only a few jobs have been treated in this report. Data are available on many other jobs and if time were taken to treat the facts as these few jobs have been analyzed, similar results would, no doubt, be found.

In three jobs that were studied, the employees passing the visual standards earned more than those who did not pass them. In the grid section, this difference is three cents per hour; in the cage building, seven cents; and in the threading and exhaust operator's section, six cents per hour.

The increases in earnings for these workers passing the vision tests for various periods of work are shown in Table I. When the differences in earnings are allowed to accumulate over a long

period of time, the significance of the small changes can be realized.

TABLE 1.
INCREASE IN AVERAGE HOURLY EARNINGS ON THREE JOBS FOR THOSE OPERATORS MEETING VISUAL STANDARDS AS COMPARED TO THOSE NOT MEETING THEM, COVERING VARIOUS PERIODS OF WORKING TIME

Job or Section	Increased Production Per Person			
	Per Hour	Per Day	Per Week (5 Days)	Per Year
Grid Section	3c	24c	$1.20	$ 62.40
Cage Builders	7c	56c	$2.80	$145.60
Threaders and Exhaust Operators	6c	48c	$2.40	$124.80

A. *Visual Standards Important to Inexperienced Workers*: Studies were made to determine to what extent *eyes for the job* are essential among inexperienced workers.

The miniature mounting section was chosen for the study of inexperienced workers because it is a relatively new department at the Owensboro Tube Works. The workers in this section were all practically re-engaged from a previous lay-off, and by far the most of them were inexperienced on any mounting job.

It was found from figures taken from the payroll section for a four-week period, that those piece workers who met the visual standards averaged 11 cents per hour more than those who did not meet the visual standards.

In order to verify these findings, another period covering five weeks was taken for study. The difference in average pay for piece workers for this period was 10 cents per hour more in favor of those employees who met the visual standards.

B. *Visual Standards Essential for Experienced Workers*: Since it was fairly well established that visual performance was an extremely important factor, it was felt desirable to obtain information on the relative benefits for experienced workers. For this study the metal mounting section was chosen. The workers in this section are all old hands at the job—all of them having had from one to 12 or more years experience on the job.

For a five-week period, piece workers who met the standards made an average of 9 cents per hour more than those who did not meet them.

When another five-week period was taken, it was found that those who met the standards again made an average of 9 cents per hour more than those who did not.

Taking another section it was found that if all the workers had met the visual standards who did not meet them, each worker for a five-week period would have made in an eight-hour day 72 cents more; in a week, $3.60 more; in four weeks, $14.40 more money.

Other sections doing piece work were tested and always with the same results. Those with the best eyes for the job are making more money for themselves, as well as for the company.

Visual Performance and Levels of Earnings

ANOTHER approach besides the consideration of average hourly earnings is the comparison of various earnings (excellent, fair, and poor) with those who pass and those who do not pass the visual standards. Fig. 1. compares the workers in the grid section with the three levels of hourly earnings. It is clearly shown that as hourly earnings increase, percentage meeting visual standards also increases. Fully 82% of the employees meeting the visual standards were in the excellent earning group. Only 18% of the excellent earners did not meet the visual standards. The fair earner group had 65% who passed the visual standards, and only 35% who did not; the poor group had 53% and 47% in these groups respectively. These data show that visual performance is an important factor in production and earnings.

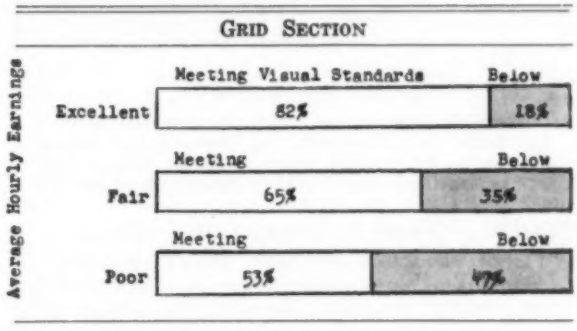

Fig. 1.
Comparison of average hourly earnings and percentage below visual standards for Grid Section. As hourly earnings increase, percentage meeting visual standards increases

Similar results were obtained from the cage builders, Fig. 2. Fully 73% of the excellent earner group passed the visual test, while 27% did not pass; 65% of the fair earners passed, and 35% did not; 52% of the poor earners passed, and 48% did not. The percentages are decidedly in favor of workers who meet standards of visual performance.

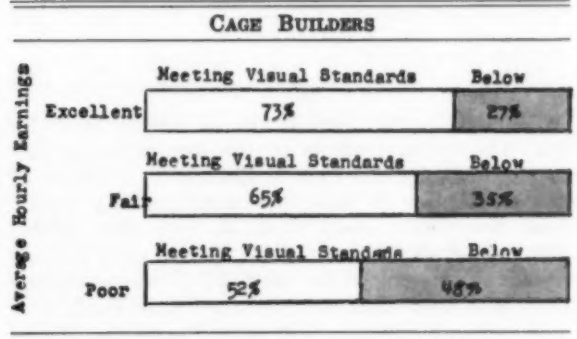

Fig. 2.
Comparison of average hourly earnings and percentage below visual standards, for Cage Builders in Mounting Section. As average hourly earnings increase, percentage meeting visual standards increases

Taking a third instance, threaders and exhaust operators, Fig. 3, the comparisons are still more favorable for those meeting visual standards. All of the excellent workers met the standards. Of the fair workers, 75% passed, and 25% did not pass; of the poor workers, only 37% passed, while 63% did not. In each of these instances, it is clearly shown that as the average hourly earnings increased, percentage meeting visual standards also increased.

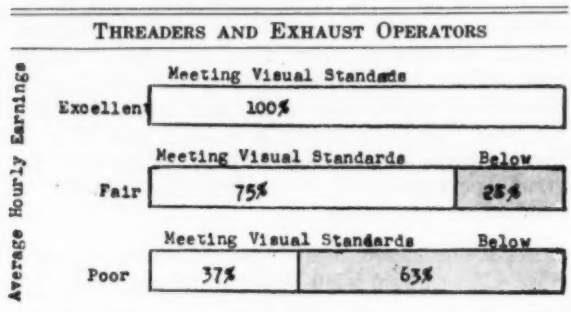

Fig. 3.

Comparison of average hourly earnings and percentage below visual standards, for Threaders and Exhaust Operators. As average hourly earnings increase, percentage meeting visual standards increases

Benefits of Visual Performance to Employer

MINIMUM MAKE-UP PAY: Small amounts of make-up pay range from zero to $5.99 per week. Table 2 shows the advantage for those passing the visual standards, as compared to those not passing these tests, for this lowest make-up pay group. These figures gain significance when the largest amounts of make-up pay among the cage builders was $24.58, and the grid section, $19.06; and the threader and exhaust operators, $12.56, per week.

TABLE 2.

PERCENTAGE OF EMPLOYEES WHO HAVE THE LEAST MAKE-UP PAY IN THREE DEPARTMENTS AND WHO PASS AND DO NOT PASS VISUAL STANDARDS FOR THE JOBS BEING PERFORMED

Job or Section	Do Not Pass Standards	Pass Standards	Diff.
Cage Builders	36%	64%	28%
Grid Section	35%	65%	30%
Threaders and Exhaust Operators	32%	68%	36%

A much larger percentage of employees who pass the visual tests is in the low make-up pay group. Among the cage builders, 28% more of the employees in this low make-up pay group pass the vision tests than do not pass them; 30% more of the employees in the grid section pass the vision tests; and 36% more among threaders and exhaust operators pass them.

In a large organization with thousands of employees, let us assume that there would be an advantage of about 1/3 saving in minimum make-up pay (data indicate that this is being very conservative) by having employees who meet the visual standards. Take an average make-up pay of $3.00 a week for the low make-up group, 1,000 employees would cost the company $3,000 a week.

Bringing the employees up to their visual standards by professional eye care or placing only new employees on the job who meet these specific standards, approximately $1,000 a week might be saved among the 1,000 employees.

Similar results of make-up pay have been found in other sections. Another group of inexperienced workers in the mounting section for a four-week working period revealed that those piece workers who met the visual standards averaged $3.00 less make-up pay than those who did not meet the vision standards. For another five-week period of work, it was found that these inexperienced workers who met the visual standards had an average make-up pay of $9.12 less than those who did not meet the standards.

Similar results in make-up pay were noted for experienced operators. Workers in the metal mounting section who met the standards made an average of $1.30 less make-up than those who did not, over a five-week period.

On another five-week period it was found that these same workers who met the standards made on the average $1.29 less average make-up pay than those who did meet the standards. Translated into terms of the company's benefits, it would, of course, mean an average of $1.30 less make-up pay per person in four weeks' time, and $1.30 times 59 workers who did not meet the standards would bring the amount up to $76.70.

Absenteeism and Visual Standards

ABSENTEEISM is always of great interest to industrial organizations, because absenteeism is expensive from the company's standpoint. An absent worker contributes nothing to production. He has to be replaced by a temporary employee who rarely maintains the level of production.

Over an eight-month period, 141 unit mounters who met the standards had a total of 789 absences. The average absence was 5.6 for this period. At the same time 66 unit mounters who did not meet the standards had 436 absences, or an average of 6.6 for the period.

The frequency of distribution of these absences was from zero to 21. Computing the significance of differences between mounters who did, and mounters who did not meet the vision standards, on the basis of a frequency distribution, it was found that there were 92 chances in 100 that the difference obtained was not due to chance. Thus it can be reasonably accepted that the visual standard is useful in identifying people who have the least number of absences.

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The Relationship of Neuralgia and Referred Pain to Hernia Compensability
—Concerning A Frequent Cause of Diagnostic Error—

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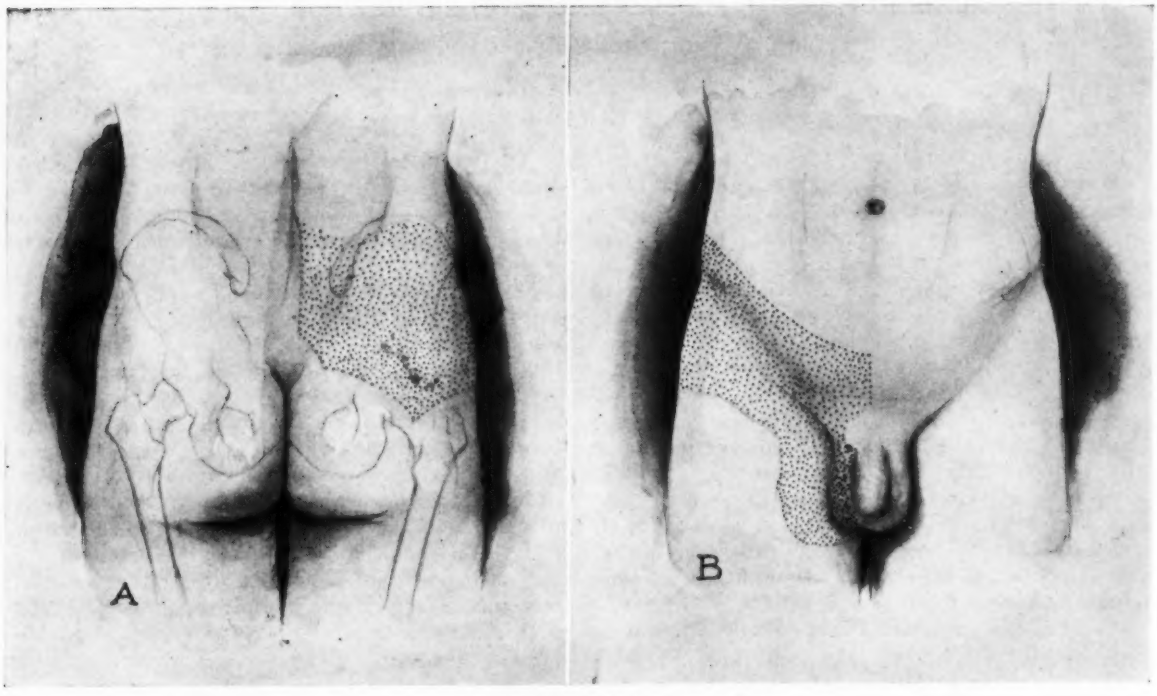
WHEN a patient consults a physician in private practice because of a hernia, the physician usually has only two duties to perform: first, to make a correct diagnosis, and second, to advise concerning treatment. The physician in industry, however, has the additional obligation of supplying information which will be of aid in determining the compensability of the hernia. Although, theoretically, the decision as to compensability is a function of the claim department (the physician's function in that respect being limited to the determination of the occupational or traumatic origin of any condition) in the usual instances of hernia it is the physician's appraisal of the history, physical examination, symptoms, and sometimes operative findings, which determine whether the condition is considered compensable.

It is not the concern of this discussion to deal with the variations in state compensation laws relative to hernia, but rather to call attention to a frequent source of error in the interpretation of the relationship of existing symptoms to the hernia, the time of onset of the clinical development of the hernia, and its compensability. This source of error is the frequently undiagnosed occurrence of either neuralgia or referred pain in the lower abdominal inguinal or scrotal regions in instances of asymptomatic hernia. The terms, "neuralgia" and "referred pain" are not used synonymously although they do have some features in common and are sometimes difficult to differentiate; there is, in fact, some dispute not only as to the correct terminology but also as to their relative frequency of occurrence. Fortunately, if the physician is watchful for evidence of neuralgia or reflex pain he will tend to avoid the error in diagnosis to which this article refers, irrespective of whether the symptoms are due to a true segmental neuralgia or a reflex (referred) pain.

Segmental neuralgia refers to a neuralgia whose distribution is confined to an area of skin supplied by a spinal nerve, such area being known as a dermatome. For example, the intercostal nerves supply successive transverse or oblique bands of skin on the trunk. Since we are concerned with hernia, the dermatomes with which we are interested are those of the twelfth dorsal and first lumbar nerves. These two nerves are often involved simultaneously and they appear to be involved more frequently than any other spinal nerves doubtless because the dorsolumbar region is so vulnerable. The skin distribution of these two nerves covers an area bounded above by a line extending from the posterior mid-line obliquely downward about an inch and one-half above the iliac crest, then over the abdominal wall about an inch above and parallel to the inguinal ligament; bounded below from about the region of the postero-superior spine by a line extending approximately parallel to the trochanters across the junction of the upper and middle thirds of the buttock, then about an inch below and parallel to the inguinal ligament, then extending medially across the upper aspect of the thigh to the scrotum. It should be noted that this area includes the sacro-iliac, upper gluteal, and entire inguinal regions, the upper and medial aspects of the thigh, and one side of the scrotum. It is within this area that local symptoms and physical signs resulting from any type of inguinal or femoral hernia occur. It is to be borne in mind that the segmental distribution of spinal nerves is somewhat variable as reported by different investigators but the foregoing distribution has been quite accurately delineated by clinical and experimental studies. This distribution is portrayed in Figures A and B.

The site of involvement causing the neuralgia is usually an irritation of either the nerve root or the nerve trunk close to their origin, or both of them involved simultaneously. The primary cause may be either local or distant. The usual local causes are scoliosis, marked lordosis, postural imbalance, involvement of the soft tissues adjacent to the intervertebral foramina, and spinal arthritis; the most common distant causes are acute upper respiratory infections and focal infections. Postural imbalance and unequal leg length should always be looked for diligently. Postural defects are usually associated with the chronic form whereas focal infections, acute respiratory infections, local strain and other trauma are commonly associated with the acute type.

In the diagnosis, the distribution and nature of the pain are first noted. This pain may be a sharp, stabbing, intermittent type or it may be of the aching, constant variety. Often it is most marked in the peripheral nerve's most distal distribution and, not infrequently, the pain radiates proximally from that area. Even more important than the site of the pain is the distribution of tenderness which should be carefully mapped out because the patient does not complain of it. It is an objective finding and the opposite side should be tested as a control. Tenderness may be either superficial or deep and one should examine for both types since only one type may be present. The superficial type is elicited by pinching a fold of skin and subcutaneous tissue whereas the deep type is elicited by firm pressure against bony prominences or deeply into the muscle. In addition to this tenderness over the distribution of the anterior division of the spinal nerves, tenderness involving the posterior primary divisions along the paravertebral area should also be sought for, as this usually co-exists.



Figs. A and B.
Sensory distribution of the twelfth dorsal and first lumbar nerves
(after Judovich and Bates)

Paresthesia may be present over the same area, also variations in pain sensibility, either hyperalgesia or hypalgesia. When the skin of the affected side is gently stroked with cotton or some soft material, the patient frequently states that the skin feels "different" as compared to the opposite side. When these areas of spontaneous pain, tenderness, and altered skin sensibility coincide with the distribution of one or more spinal nerves, a segmental neuralgia may be said to exist.

The existence of a reflex or referred pain in contradistinction to a true segmental neuralgia must be borne in mind and differentiation may be quite difficult. For example, in the muscles contiguous to the cervico-dorsal spine attached to the shoulder girdle, one frequently finds local areas of fibromyositis which cause various reflex phenomena in the arm, forearm, and hand. Such phenomena include tenderness, paresthesias, and altered skin sensibility with subjective symptoms of pain, a sense of "tightness" and impaired mobility of the muscles and tendons of the hand and forearm, the symptoms and objective findings covering a spinal segmental distribution and not the peripheral nerve distribution of segmental neuralgia. In the paravertebral area of the dorso-lumbar region a similar localized muscle involvement is frequent, causing referred pain in the inguinal, femoral, or scrotal regions. Induration and tenderness of the local area in the muscle together with the occasional demonstration of a grating sensation on palpation indicate local pathology. The immediate improvement in the symptoms and in the objective findings after the injection of a local anesthetic into the tender zone of the muscle indicates that the local pathology in the muscle is the site of primary involvement from which the reflex symptoms and signs arise. The exact mechanism is not understood but since a spinal segment is involved reflexly, the distribution of the symptoms and signs may occur along multiple peripheral nerve areas. This confusing distribution of pain and tenderness is not clear-cut as it is in segmental neuralgia and, since the involved area in the muscle is not complained of by the patient, the cause of the condition is frequently overlooked and treatment misdirected. A local involvement in an interspinous ligament may give rise to similar referred symptoms although the pattern is not so exact and the tenderness less constant than is the case in segmental neuralgia. For example, in a patient recently treated, there was an involvement of the interspinous ligament between the twelfth dorsal and first lumbar vertebrae with referred symptoms to the groin which was immediately relieved by the injection of a local anesthetic into the involved area.

Thus, one might conclude that when the symptoms and signs are confined to zones representing the peripheral distribution of one or more spinal nerves the condition should be classed as a segmental neuralgia. But when they do not correspond to the distribution of one or two adjacent spinal nerves (following a spinal segmental pattern instead) one should consider them to be reflex or referred from some local, deep fibrositic involvement of muscle, fascia, ligament, joint capsule, or periosteum.

SINCE such neuralgic or referred pains in the inguinal region are common, it is obvious that they have an important bearing on the clinical evaluation and appraisal of the compensability of hernia. A typical instance is that of a patient whose only complaint is that of pain in the inguinal region allegedly developed immediately or shortly after lifting or twisting his back. If, on examination, a hernia is found, the examiner is likely to conclude (since the small hernia first became "disclosed" during an act of lifting or straining accompanied by pain in the groin, the patient denying the previous existence of a hernia and previous examination records failing to indicate the presence of a hernia) that the hernia is compensable since several of the criteria of compensability have been met. The patient is operated upon, an uneventful recovery ensues, the pain subsides during the postoperative convalescence, and no one is the wiser. In many instances of this kind, however, if the examiner strips the patient and makes a careful examination, he will find tenderness of the testicle on the involved side, tenderness of the scrotal skin, or either deep or superficial tenderness involving the distribution of the twelfth dorsal and first lumbar nerves, and perhaps a change in the cutaneous sensibility of the skin on the involved inguinal region. He may also find deep paravertebral tenderness over the erector-spinae muscles two or three inches from the mid-line, opposite the twelfth dorsal or the first or second lumbar vertebrae. This is sufficient to make a diagnosis of segmental neuralgia secondary to some local or systemic cause. Or local tenderness may indicate an involvement of an interspinous ligament or of muscle in the paravertebral area in the dorso-lumbar area as a cause for reflex phenomena in the inguinal region. In either event the finding of a hernia on examination must be regarded as being purely coincidental and having no relationship to the patient's symptoms or objective signs. Since at least 5% of adult males undergoing a physical examination exhibit a symptomless hernia of which they have no knowledge, it is obvious that a similar percentage of patients having neuralgic or referred pains in the inguinal region will exhibit hernias on examination. On questioning, patients occasionally admit having pain in the dorso-lumbar region, but since the pain in the inguinal region or scrotum is so much worse, mention is made only of the latter. Even if tenderness cannot be elicited over the lower abdominal, inguinal, or scrotal regions, it can usually be demonstrated paravertebrally opposite the dorso-lumbar junction. In acute cases, the symptoms and signs may disappear spontaneously in four or five days and if the examiner fails to elicit them within that time, the diagnosis may be missed forever. The symptoms may be banished or much improved by the injection of procain paravertebrally around the twelfth dorsal and first lumbar nerves, thus confirming the diagnosis, since such disappearance would not occur were the origin visceral. Another test consists of applying a truss which does not relieve the pain if the origin is neuralgic or referred. Further confirmatory, though indirect, evidence is furnished by the not infrequent occurrence and demonstration of a similar hernia on the opposite side which is painless and of which the patient has no knowledge. This brings to mind the recent example of patient who had a neuralgia coincidental with a small hernia on the right side and for which we applied a truss, observing him for several months; at the end of this time, we found a small hernia on the opposite side which had previously been negative. This new hernia had caused no symptoms whatsoever during its development.

Assuming that most of the criteria of hernia compensability have been met, it has been our experience that many physicians ascribe so much importance to the co-existence of local pain, that they are of the opinion that an alleged strain was a factor in producing a palpable hernia. If they fail to examine the patient for evidence of the existence of neuralgic or reflex symptoms and signs, their report may give a very inaccurate analysis of the case.

Workmen's compensation boards in various states need education along this concept and state compensation laws might well take cognizance of it. It is not the writer's purpose to deny any employee what is rightfully his due, to delimit the social purposes of compensation laws, or to restrict insurance companies or corporations in their method of disposing of hernia claims. However, it is the physician's duty to adhere to a scientific approach to any problem and to help clarify the confused question of hernia. It is realized that, under the present construction of hernia legislation which is so loosely drawn in many states, the demonstration of the diagnosis of a segmental neuralgia or a reflex pain may have little influence on the attitude of an insurance company, corporation claim department, or state compensation board, but this does not excuse the physician from making a scientific appraisal of the case and rendering such an opinion in his report.

Some observers have pointed out that because they have so frequently found patients with hernia complaining of backache, in every patient coming in complaining of backache they invariably look for hernia, and since they have found a hernia in quite a number of these patients, they have concluded that the hernia was the cause of the pain in the back. It is our feeling that their reasoning should be reversed and that, in all probability, they were dealing with instances of segmental neuralgia emanating from the back as a primary cause and that the hernia was a coincidental, symptomless hernia. Careful examination of many of these patients, no doubt, would have indicated a neuralgic or reflex syndrome. It is realized, however, that since peritoneal irritation and inflammation cause parietal pain and occasionally referred pain to distant

zones (the so-called "Head zones") the sudden protusion or acute enlargement of a hernia sac might cause referred symptoms. The differentiation is not difficult if careful examination is made for superficial or deep tenderness over the dorso-lumbar paravertebral area and along the entire skin distribution of the twelfth dorsal and first lumbar nerves, with variations in the skin sensibility and frequently, tenderness of the scrotum and testicle. When such symptoms and findings are found, one can discount the hernia as being productive of such symptoms and signs and consider it as due to either a neuralgic or reflex syndrome.

If a small easily reducible hernia is found with the patient disclaiming any knowledge of its pre-existence, one should view with still more skepticism the conclusion that the hernia is the cause of symptoms and signs and such skepticism will frequently be rewarded by the demonstration of signs of either neuralgic or reflex phenomena. More difficult of evaluation are instances where only an impulse, indicative of a congenital sac, is felt; the examiner may conclude that intra-abdominal content may be protruding into the sac intermittently and that this stretching of the sac is the cause of the pain and the tenderness in the inguinal canal. If the typical signs of a neuralgic or reflex origin are found, however, the idea of a small hernia being the cause can usually be discounted. An impulse within the inguinal canal without being productive of any symptoms is found very frequently on routine examinations. The same consideration applies to many instances of diffuse bulging medial to the internal ring at the site of development of direct hernia. It is always difficult to state when the degree of such bulging is sufficient to classify it as a direct hernia. Since these are virtually always of very slow, gradual origin one should be suspicious when such conditions suddenly become symptomatic. And, when they do, search should be made for evidence of neuralgic or reflex phenomena as described in the foregoing.

Of course, many hernias do cause symptoms but they rarely cause superficial or deep tenderness or alteration in skin sensibility over the area of distribution of the twelfth dorsal and first lumbar nerves. A dragging pain may be felt in the groin, in the lower abdomen, or diffusely in the abdomen; on rare occasions, perhaps, a reflex pain may be referred to the back. Obviously, when severe strain is sustained, when a sac becomes distended by intra-abdominal content for the first time, when the content of pre-existing hernia suddenly becomes greatly augmented or when some of the fibers in the fascial wall of a direct hernia suddenly become stretched or even torn—acute pain and tenderness in the inguinal canal do occur. Differentiation con be made because the findings in such instances are confined to the inguinal canal and scrotum and do not have the diffuse or scattered areas of superficial or deep tenderness and changes in skin sensibility over the distribution of the nerves. Furthermore, the application of a correctly fitted truss should alleviate the symptoms if caused by the hernia.

If the objective signs in the inguinal region are negative and no evidence of hernia or weakness of the wall is found in a patient who alleges an acute strain followed by pain in that region, it is an unfortunate but common experience for physicians to make a haphazard diagnosis of "strain of the tissues of the inguinal region." Most such mistaken impressions would be corrected if the physician had due cognizance of the frequent reference of pain and tenderness over this area from a primary involvement of the dorso-lumbar region and would examine the patient with that idea in mind. In fact, when a patient complains of pain in the inguinal region it is well to examine his back first, then to go over the entire distribution of the twelfth dorsal and first lumbar nerves for tenderness and alteration in skin sensibility and then, last of all, to examine the inguinal canal. And it should be remembered that tenderness of the scrotal skin and of the testicles is far more common in the neuralgic and reflex syndromes than in the presence of hernia.

Summary

SEGMENTAL neuralgia secondary to an irritation of the roots or trunks of the twelfth dorsal and first lumbar nerves and reflex phenomena secondary to soft tissue involvement of the paravertebral area in the dorso-lumbar region, are frequent causes of pain and tenderness in the inguinal region and scrotum.

2. Failure to recognize the neuralgic or reflex origin of such symptoms and signs is a frequent source of diagnostic error in evaluating the relationship of a hernia to such symptoms and signs.

3. The concept of the compensability of hernia is altered by the demonstration of the existence of a neuralgic or referred pain syndrome. A pre-existing asymptomatic hernia with coincidental neuralgic or reflex symptoms from a distant source may falsely appear to have criteria of compensability unless the origin of such symptoms is recognized.

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A New Development in Antihistaminic Therapy

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SINCE Dale and Laidlaw, in 1911, first observed the resemblance of histamine shock to the symptoms of anaphylaxis, the theory concerning the role of histamine or histamine-like substances in the precipitation of allergic reactions has stimulated an intensive search for an ideal histamine antagonist. The manner in which antihistaminics exert their effects is not completely understood, but it is generally thought that they compete with histamine for the same receptor cell, displacing histamine from the point of action and thus temporarily preventing the production of allergic symptoms.

With the prevalence of major allergies throughout the general population (believed at least 10%, and probably more), the control of allergic disorders is of growing concern to industry. The distress of hay fever or asthma, the tormenting itch of atopic eczema or urticaria, and the disability caused by migraine and other chronic sensitivities may seriously interfere with the efficiency of the worker and increase absenteeism. There is urgent need of a safe medication that will promptly lessen the discomforts of the allergic worker and permit him to continue on the job.

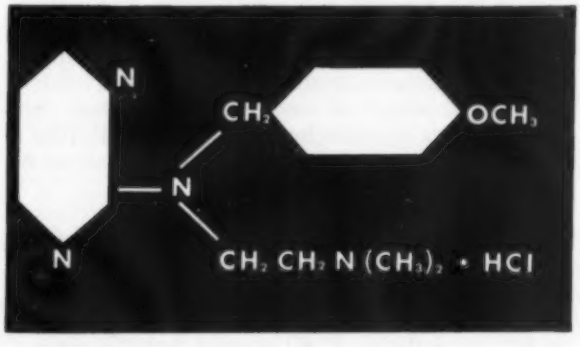
Heretofore, efforts to synthesize chemical compounds designed to combat the action of histamine have produced many formulas with more antianaphylactic than antiallergic activity. Some were effective experimentally but too toxic for clinical trial, and others displayed satisfactory antiallergic effects but caused a multitude of side reactions frequently intolerable to the human patient.[1] Especially in the industrial field, untoward reactions from antihistamine therapy may jeopardize the safety of the individual himself, and cause him to be dangerous to his associates or to the public. Sedation has been the most common complaint; headache, dizziness, mental confusion, severe nervousness, palpitation, tightness in the chest, gastro-intestinal disturbances are frequent; and dysuria, neuritic pains and reactions ending in circulatory collapse and unconsciousness have been reported.[1] The hypnotic effect of some commonly used antihistaminic drugs; and the disorientation, marked excitation, epileptiform movements and irrational mind are especially to be feared in railroad workers, autoists, those operating machinery or using tools, and many others in active vocations. Feinberg[2] reports that "accidents and near accidents ....have occurred because of this disturbed sensorium and it can readily be seen how such effects on the nervous system may be disastrous in certain occupations."

In some instances the use of antihistaminics has exaggerated the patient's suffering, as in two cases recently reported.[3] Antihistamine therapy administered for hay fever, relieved the respiratory symptoms but provoked eczema of face, neck and arms; and in two other patients[1] caused a generalized eruption after use for atopic eczema. Additional reports describe granulocytopenia[1] attributed to an antihistaminic agent; and in elderly males, acute retention of urine.[4]

Since experimental findings suggest that histamine may not be entirely responsible for sensitivity reactions, and that drugs with increasingly higher antihistamine action will have no greater therapeutic effect than others of less potency, efforts to develop a more satisfactory antihistaminic have been directed toward agents which, while exhibiting more consistent antiallergic behavior, are better tolerated even by very sensitive patients.[5] The search has led to the synthesis of Neohetramine*[6] (methoxy derivative of an earlier preparation) which, on experimental study and clinical trial, maintained a high level of effectiveness and showed less toxicity than any other antihistaminic in use.

Chemistry

NEOHETRAMINE is a stable crystalline compound which melts at 173 to 176 C. It is highly soluble and relatively stable in aqueous solution. At concentrations of 1 and 20%, solutions of Neohetramine exhibit pH values of 5.7 and 4.5 respectively, and may be adjusted to pH 7.0 without precipitation. A 0.2 molar solution of Neohetramine (6.35% at 27 C.) is approximately 45% dissociated and is isotonic with mammalian serum. The structural formula is as follows:



Pharmacology

IN THE experimental studies of Scudi, *et al.*,[7] the acute toxicity of Neohetramine in mice was found to be about one-half that of other antihistaminic agents. The oral LD_{75} for guinea pigs is 1100 mg. per kilogram. In mice the oral LD_{50} of Neohetramine is approximately twice as high as the intraperitoneal LD_{50}, and in guinea

*Trademark of the Nepera Chemical Co., Inc., for its brand of thonzylamine hydrochloride, N, N-dimethyl-N'-p-methoxybenzyl-N'-(2-pyrimidyl) ethylenediamine monohydrochloride; distributed by Wyeth Incorporated.

pigs it is about five times as high. Determinations of chronic toxicity showed that weanling rats receiving as much as 200 mg. orally or 20 mg. subcutaneously per kilogram of body weight, for a period of 91 days, showed normal growth and a complete absence of organ pathology or morphological changes in the blood.

Further experiments revealed that in counteracting the various manifestations of histamine toxicity and anaphylactic reactions, Neohetramine (1) has a marked capacity to protect animals against injected or nebulized fatal doses of histamine; (2) it shows definite activity against the bronchiolar, capillary, local vasodilator, smooth muscle, and vasodepressor actions of histamine; and (3) affords excellent protection against anaphylactic shock in actively and passively sensitized guinea pigs.

Neohetramine produces some ventricular depression, bradycardia and a transient vasodepression, as do other antihistaminics. It does not, however, alter sympathetic response nor potentiate the action of epinephrine.

On smooth muscle, low concentrations of Neohetramine are depressant; large concentrations induce contraction. In the eye, it produces a transitory irritation accompanied by local anesthesia comparable to that obtained with procaine. Neohetramine enhances intestinal response to vagal stimulation but is also weakly parasympatholytic. It has slight atropine-like properties, as indicated by its ability to depress salivary secretion from stimulation of the chorda tympani.

Clinical Studies

IN AN extensive clinical trial, conducted in seven separate series[8a-14] Neohetramine was administered to 874 patients suffering from various types of allergy (seasonal and perennial rhinitis, asthma, urticaria, angioneutrotic edema, contact dermatitis, atopic eczema, serum sickness, migraine, allergic headache, and drug sensitivities). The treatment periods varied from seven to 84 days.

DOSE: The size and frequency of the dose differed for individual patients, and were influenced by environmental conditions. The average was 50 to 100 mg. two to four times (100 to 400 mg.) daily. In Criep and Aaron's series[10] of 249 patients, 50 mg. of Neohetramine was given every four hours. The average adult dose used by Friedlaender and Friedlaender [8a] varied from 25 to 100 mg., given three or four times daily, preferably after meals and at bedtime. (Children tolerated doses of 10 to 50 mg. very well.[8a]) For intermittent symptoms the drug was employed only as required. Some patients with mild symptoms were kept comfortable on as little as 50 mg. a day. When environmental excitants were present in greater concentration, and respiratory distress or other evidences of sensitivity became more acute (as in the seasonal allergies) the drug was safely given in larger, more frequent doses. As symptoms subsided, the dosage was reduced to the smallest amount effective for comfort.

For the more or less continuous symptoms of perennial rhinitis Neohetramine may be used three or four times daily, usually in 50 mg. doses.[8a] When symptoms are irregular the medication may be administered as needed and repeated in four to six hours if necessary.[8a] When symptoms are confined to the morning hours, a dose taken immediately on arising or after breakfast will suffice for most patients. Atopic dermatitis in many patients is troublesome only at night. One dose of the antihistaminic at bedtime usually affords a night's rest.[1]

Feinberg[1] successfully used antihistamine treatment to eliminate much of the skin irritability in extremely sensitive patients whose dermographism prevented accurate interpretation of skin tests. One or two doses taken orally three or four hours and one hour prior to performance of the tests brought about the desired result and interfered very little with specific skin response to the antigen. Criep and Aaron[10] forestalled the occurrence of systemic side reactions during hyposensitization against ragweed by giving Neohetramine, in an amount up to 200 mg., 24 hours before and an additional dose of 50 mg. 45 minutes prior to the next scheduled injection.

RESULTS: Of 874 patients, representing 999* separate cases of various allergies, 644 cases (64.5%) were benefited—some to a moderate degree and others obtained marked relief.[8a-14] In the majority, symptoms subsided within 30 minutes after ingestion of the drug[8b] and relief was sustained for three to six hours. The therapeutic effects of Neohetramine in each separate condition are shown in Table 1.

All investigators [8a-14] concurred that Neohetramine is the least toxic of all antihistaminics now in general use. Of the entire series, an average of only 10.9% of patients noticed side effects. (Other agents tested caused unpleasant reactions in 20 to 73%.) Those who experienced side reactions reported mainly a slight nervousness; drowsiness and dizziness were not important factors. Only 1% of all seven groups discontinued treatment, usually because of headache or gastric disturbances.

Blood pressure and hemoglobin determinations, blood counts, urinalyses and electrocardiograms were performed on 173 patients, selected at random from all series, at various times throughout the investigative period. In no instance was there any evidence of pathology or aberration from the normal because of antihistiminic therapy. Results of toxicity tests on experimental animals closely paralleled the clinical findings.[7]

Friedlaender and Friedlaender[8a, b] reported that Neohetramine was extremely well tolerated

*Certain of these individuals had more than one allergic syndrome, as rhinitis and asthma, or hay fever and urticaria, and since the clinical effect of Neohetramine on each manifestation of allergy was not necessarily the same in each patient, individual symptoms have been tabulated separately.

TABLE 1.
THERAPEUTIC EFFECTS OF NEOHETRAMINE

Allergy	Total Cases	No. Benefited	% Benefited	% Side Reactions
Hay Fever	562	387	68.8	11
Vasomotor Rhinitis	133	87	65.4	8
Asthma	189	82	43.3	6
Urticaria	48	39	81.2	11.5
Angioneurotic Edema	12	8	66.6	0
Contact Dermatitis	18	12	66.6	7.6
Atopic Eczema	17	14	82.3	40
Serum Sickness	3	3	100.0	0
Migraine	10	7	70.0	25
Allergic Headache	5	3	60.0	0
Drug Allergy	2	2	100.0	0
TOTALS	999	644	64.5	10.9

by their patients. They found it particularly valuable for many extremely sensitive individuals unable to take other antihistaminics because of unpleasant reactions. Criep and Aaron[10] consider that the great value of the drug lies in the rarity of side reactions produced.

In flexural and infantile eczema, and neurodermatitis of the atopic type, Feinberg[1] feels that oral antihistiminic therapy is of special value, not only for relief of itching but for general improvement of the skin condition.

In asthma, according to Friedlaender and Friedlaender,[8a] antihistiminics appear to be of greater benefit in relieving the associated spasmodic cough. Criep and Aaron[10] were unable to make a definite correlation as to the type of asthma and the increase or decrease of vital capacity observed in their patients after use of Neohetramine. Improvement occurred usually in asthmatics suffering from the extrinsic type. (Feinberg[1] feels that child patients with asthma show a more favorable response to antihistamine drugs than do adults.)

An important observation was that patients with seasonal allergies, who had been partially protected by hyposensitization or who were receiving specific desensitization while Neohetramine was administered, responded most satisfactorily to antihistamine treatment.[1,8a]

All investigators emphasize that antihistaminics should be used only for control of active symptoms, but they do not take the place of epinephrine in the emergency treatment of acute anaphylactic shock. At the present stage of clinical experience antihistamine therapy should not be prolonged for more than two or three months. These drugs do not correct all of the manifestations of allergy;[1] no permanent benefit should be expected from antihistaminics alone.[15]

Antihistaminics are not a substitute for, but a supplement to, thorough immunologic investigation and management of the hypersensitive patient.

In the opinion of Friedlaender and Friedlaender,[8a] "The determination of specific etiologic factors, the elimination of offending allergens where possible, or hyposensitization when necessary, are the sole means at present of achieving lasting results in allergic disease."

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Prevention of Silicosis in the Steel Industry

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The Timken Roller Bearing Company,
Canton, Ohio

THE Timken Roller Bearing Company was one of the pioneers in electric furnace steel manufacture, requiring a tremendous amount of electric current in order to acquire a temperature in the furnace of molten metal of over 3,000°.

In the construction of this type of electric arc furnace, silica brick are required to line and form the top which is rounded and convex. The chemical composition of the silica brick or block that is used is 95 to 97% SO_2.

The steel industry is particularly interested in the prevention of silicosis to which the bricklayers are exposed in scotching the silica brick. The silica brick manufacturers should be interested in doing whatever possible to prevent this disease.

At the Timken Roller Bearing Company, we have eliminated 95% of this exposure by using silica prefabricated molds in constructing the roof. We also have followed the procedure of spraying the brick in the car on arriving at the plant before unloading, and we have constructed an oil spray surrounding the conveyor which carries the brick from the car, covering the silica brick with oil before handling, and prior to the remaining scotching process necessary.

Through the cooperation of both industries, silicosis in the steel mill industry can be completely eliminated by following this program: (1) Silica brick manufacturers should spray all silica brick with oil before loading cars for shipment. (2) Silica brick should be passed down the conveyor and through an oil spray when unloading cars at the steel mill. (3) Prefabricated silica molds should be used in making the top which eliminates 95% of all scotching. These blocks are put together making the top just like putting together a jig saw puzzle, requiring practically no scotching.

In conclusion, scotching is chipping brick which causes a small cloud of silica to which the bricklayers are exposed. By elimination of 95% of this process, we reduce not only the small cloud of dust surrounding the bricklayers, but also the quantity of silica dust on location. With oil spray of all silica brick, we have eliminated a serious hazard of exposure to silica in the steel industry, which is not uncommon. Arc furnaces cannot be constructed without silica bricks or molds.

By following the above program, we have accomplished what industrial medicine is most interested in accomplishing—that is, prevention of disease.

Dr. K. E. Dowd (standing, right), chief medical officer, Canadian National-Grand Trunk Western Railways, Montreal, and chairman of the Medical and Surgical Section of the Association of American Railroads, welcomes C. R. Harding, president, Pullman Company, Chicago, chief speaker at the 28th Annual Meeting of the railway medical group in the Drake Hotel, Chicago. Seated, left to right, are: Dr. A. R. Metz, chief surgeon, the Milwaukee Road; Mrs. R. M. Graham; Mrs. C. R. Harding; Dr. R. M. Graham, director of sanitation and surgery, Pullman Company; and Dr. L. J. Haydon, chief medical officer, Associated British Railways, London, England

ASSOCIATION NEWS

Board of Directors' Meeting

A VERY excellent Board of Directors' meeting was held at the Drake Hotel in Chicago on Monday, June 21, 1948. It started with a luncheon attended by the following officers and directors: HAROLD A. VONACHEN, President; ALFRED H. WHITTAKER, President-Elect; EDWARD H. CARLETON, Vice-President; ADOLPH G. KAMMER, Second Vice-President; FREDERICK W. SLOBE, Secretary; EDWARD C. HOLMBLAD, Treasurer; Directors: ALLAN J. FLEMING, ROBERT M. GRAHAM, E. A. IRVIN, JAMES M. CARLISLE, HAROLD M. HARRISON, EDWARD P. HELLER, EARL F. LUTZ, ROBERT COLLIER PAGE, GEORGE F. WILKINS; District Counsellor: H. GLENN GARDINER; Component Society Representatives: New England Conference—J. R. KNOWLES, New Jersey Association—E. W. PROBST.

Also attending were past presidents WM. A. SAWYER and R. R. SAYERS, STEPHEN HALOS, Director of Exhibits, and MR. W. R. LUNDY, Executive Secretary of the ASSOCIATION OF MINE PHYSICIANS.

The reports of the treasurer, secretary and managing director were presented, discussed, and accepted.

The final report of the 1948 Boston Convention revealed it to be one of the best conventions held by the Association. The attendance awards at the convention exhibit has been one of the best innovations in recent years.

The application of the ASSOCIATION OF MINE PHYSICIANS as a component society of this Association was acted upon favorably with the condition that the applications of these individual members of the ASSOCIATION OF MINE PHYSICIANS be submitted to the membership committee of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS for study and recommendation for membership classification.

The following members were elected to fellowship: G. K. OXHOLM, KENNETH E. MARKUSON, JAMES SCOTT CHALMERS, HAROLD M. CHANDLER, H. GRAHAM ROSS, HAROLD R. HENNESSEY, R. L. LAMY, RUSSELL R. ROBSON.

DR. HERBERT L. DAVIS of Cleveland, Ohio, and DR. PHILIP M. SAVAGE of Highland, California, were elected to honorary membership.

DR. JOSEPH A. SANFORD, who had been a member and fellow of this Association for many years, has returned to industrial medicine as medical director of the Fieldcrest Mills, a division of Marshall Field & Co., at Spray, N. C., and was reinstated to fellowship.

The membership committee reported an excellent survey of the new applications and 40 members were elected to active membership, 12 were elected to associate membership, and one application was deferred pending county medical society certification. The membership committee has made certain recommendations to the Board of Directors for changes in the by-laws governing the qualifications of members. These are to be further discussed by the Board of Directors, published in INDUSTRIAL MEDICINE magazine and presented as recommended changes in the by-laws to be acted upon at the annual Association meeting which is to be held in Detroit during April, 1949.

DR. WHITTAKER reported on the progress towards the Detroit, 1949, Convention and the dates are April 2 to April 10 inclusive, with the A.A.I.P.&S. program being presented over a period of four days, April 5, 6, 7 and 8.

The reports of four committees, namely Certification, Medical Education and Graduate Fellowship, Foundation Fund Raising and Public Relations were considered jointly. There was an abundance of enlightening discussion and opinion relative to the reports of the activities of these committees. DR. JOHN NEILSON, JR., represented the committee on Health Achievement in Industry Award which had held a committee meeting in Chicago on Sunday, June 20. DR. LEO PRICE presented a definite progress report for the Committee on Tuberculosis. The National Exposition of Industrial and Community Health Committee, chairman DR. F. W. SLOBE, presented the progress made by that committee, and the Association Board of Directors voted to proceed with the sponsorship of this Exposition with certain conditions. DR. BROWN'S Past President's report and a brief report from DR. OLSON on the Workmen's Compensation Committee were presented.

It was gratifying to observe that the work of this Directors' meeting was terminated a little after 5:00 P.M.

It is probable that the next Board of Directors' meeting will be held sometime in the fall of 1948, probably at the meeting of the Congress of Industrial Health.

An Executive Meeting was held and they will hold frequent meetings for the specific purpose of carrying out the further orders of the Board of Directors and the business of the Association.

The reports of all of these officers, directors and committee chairman are always available for inspection at the Association office and it is planned that certain of these reports be published in our official publication, INDUSTRIAL MEDICINE magazine regularly.

London Congress on Industrial Medicine

ABOUT 40 copies of the program for the Ninth International Congress on Industrial Medicine to be held in London, September 13 to 17, 1948, are available to those interested. Write the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS at 28 E. Jackson Boulevard, Chicago, or DR. W. A. SAWYER, 343 State Street, Rochester 4, New York. Application blanks are also available to attend this very comprehensive congress of six separate sections, each having from four to nine sessions on a special phase of industrial medicine. To attend, your application, reservations and transportation accommodations should be completed as far in advance as possible.

DR. EVERETT W. PROBST has been appointed Medical Director of Remington Rand Incorporated. He will have charge of the dispensary at the Elmira plant and will coordinate the industrial hygiene and medical services in all the other Remington Rand plants throughout the country.

DR. PROBST was formerly Medical Supervisor of the Arlington, New Jersey, plant of E. I. du Pont de Nemours & Co. and for a short time was assist-

ant manager of the Industrial Toxicology Department of Union Carbide and Carbon Corporation. He is a graduate of Lafayette College and New York University Medical College. During the war, he directed the Industrial Medical program for 20,000 employees at Picatinny Arsenal, Dover, New Jersey, and left the services with the rank of Lt. Colonel. He is a member of the American Medical Association, the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, and a Fellow of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, the AMERICAN PUBLIC HEALTH ASSOCIATION and the AMERICAN ACADEMY OF OCCUPATIONAL MEDICINE. At present he is the secretary of the New Jersey ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS.

DR. ROBERT CLINTON PAGE, who has been Assistant Medical Director of the Texas Company, with offices at 135 E. 42nd Street, New York City, has recently been appointed Medical Director of Arabian-American Oil Company, Dhahran, Saudi, Arabia.

WE NOTE the death of DR. ROBERT ALFRED HEARN, a member of this Association for several years. He died September 1, 1947. He was formerly with U. S. Public Health Service, Director of Industrial Hygiene, State Board of Health of Arkansas. He served as Medical Director of the Indiana Division of the Republic Aviation Corporation in Evansville.

Report of the Workmen's Compensation Committee To the Officers and Board of Directors American Associaton of Industrial Physicians and Surgeons, Boston, April 1, 1948

Abstract of Report

THIS abstract covers the salient features of the following formal report, in the shortest possible form which would cover the subject.

I. Legislation in 1947 affecting Workmen's Compensation:

A new compensation law was enacted in one state.

New occupational disease laws were enacted in six states.

The compensation payable was increased in 24 states.

Death benefits were increased in 12 states.

Medical limits were raised or completely abolished in five states.

Clerical workers, domestic help, and officers of corporations were included under the acts of several states.

A safety program was made compulsory in Florida.

Waivers for physical defects, and for aggravation of previous conditions were admitted in two states.

Hospital, nursing and ambulance service were provided for by several states.

Second injury funds were created in six states, bringing the total to 43 states.

Loss of hearing when due to external trauma was made compensable.

Occupational disease schedules were set up in eight states.

Advisory medical boards were created in four states.

Medical examinations were made mandatory in one state.

Commissions for study of the compensation problem were set up in two states.

"Repetitive Trauma," Dupuytren's contracture, were made compensable.

II. Unethical Medical Testimony Committees:

The Minnesota Committee, formed in 1940, has dealt with 13 complaints, the last one in 1945. The results have been highly pleasing to the committee, which remains watchfully inactive.

The Illinois committee, formed in 1945, is active at this time, having entertained complaints against five offenders. The committee intends to broaden its activities to include the Industrial Commission in the near future.

Two other states, Michigan and Maryland, are said to be considering the establishment of similar committees.

III. Rehabilitation of the Handicapped:

Interest in this subject is kept alive and possibly increased by the publication of literature from various sources, and by two movie films. But there is still a reluctance on the part of the handicapped to "come and get it."

IV. Minor Developments and Trends:

The International Association of Industrial Boards and Commissions is holding annual meetings where excellent papers are presented and later published.

Fortune Magazine has made an interesting and enlightening survey of the reactions of the typical American factory worker.

A study of the cost of lost-time accidents in industry reveals the cost to run slightly over $100.00 per case.

A Tennessee decision suspended compensation where a disabled worker refused serologic tests for diagnosis.

Studies are being conducted on various new poisonous substances which are being accepted into industrial production.

BAL (British Anti-Lewisite) has found its way into the therapeutics of American industry.

Paralysis from fright was made compensable in Massachusetts.

Ganglion of the dorsum of the hand was labeled on occupational disease in New York State.

The Report in Full

Part One: 1947 Legislation

THE odd years are by common custom the years for extensive legislation to be enacted in all the states. This was done in 1947 by the legislatures in 29 states. For the most part amendments were passed which broadened and liberalized the already existing laws. The chief phases to be dealt with were increases in the medical provisions, and increases in the amounts of compensation payable. However, some other problems were also dealt with. All those of any importance are briefly reviewed below.

Legislation dealing with Industrial Accidents

ALABAMA: (1) provided a second injury fund by amendment.

CALIFORNIA: (1) increased the death benefit; (2) increased the compensation payable.

COLORADO: (1) increased the death benefit; (2) increased the compensation payable.

CONNECTICUT: (1) amended the act so as to include nursing service; (2) increased the compensation payable; (3) added "repetitive trauma," with special reference to Dupuytren's contracture, to its act. (This is a new provision.)

DELAWARE: (1) abolished the medical limitations in its act; (2) increased the compensation payable.

FLORIDA: (1) increased the compensation payable; (2) amended the act to provide for an adequate safety program which must be developed and maintained by the employer. (This is a new provision.)

IDAHO: (1) revised its medical fee schedule, principally upward.

ILLINOIS: (1) increased the compensation payable; (2) increased the death benefit.

INDIANA: (1) increased the medical limitations; (2) increased the death benefit; (3) provided that persons with a physical defect may, with approval of the commission waive compensation.

IOWA: (1) increased the compensation payable; (2) increased the medical maximum payable; (3) included nursing and ambulance service; (4) included clerical workers under the act.

KANSAS: (1) increased the medical maximum payable; (2) increased the death benefit; (3) increased the compensation payable.

MARYLAND: (1) increased the medical limitations; (2) increased the hospital limitations; (3) increased the death benefit; (4) increased the compensation payable.

MASSACHUSETTS: (1) increased the compensation payable.

MINNESOTA: (1) increased the compensation payable; (2) provided that officers of a corporation are entitled to compensation.

MONTANA: (1) increased the compensation payable.

NEBRASKA: (1) enacted a second injury fund.

NEW HAMPSHIRE: passed an entirely new and modern compensation act, which: (1) includes all employed persons except farm labor and domestic help; (2) but provides for farm and domestic help if they so elect; (3) provides for compensation payments; (4) provides for medical and hospital care; (5) provides for a death benefit; (6) provides for burial expense in no-dependency cases; (7) provides for double compensation for minors illegally employed; (8) provides for a second injury fund.

NEW JERSEY: passed an amendment to provide for re-opening of cases which had been dismissed for want of prosecution.

NEW MEXICO: (1) increased the compensation payable.

NEW YORK: passed the largest number of amendments. The more important ones are: (1) increase of the time limit for filing a claim; (2) a provision that medical care rendered shall not constitute compensation; (3) an extension of the period for the $10 assessment against the employer in each case of schedule injury for another year; (4) a provision that officers of a corporation be covered by compensation; (5) a provision that funeral expenses be paid for death from causes other than injury; (6) a provision to pay for x-rays only to a roentgenologist, a hospital, or a laboratory.

NORTH CAROLINA: (1) increased the death benefit; (2) increased the compensation payable.

RHODE ISLAND: (1) created a special commission to make a thorough and complete study of Workmen's Compensation Laws in these and other states and report to the Governor its recommendations; (2) increased the allowance for hospital services; (3) provided that for the loss of hearing compensation shall be paid where such loss is due to external trauma.

SOUTH DAKOTA: (1) increased the death benefit; (2) increased the compensation payable; (3) provided for a second injury fund.

TENNESSEE: (1) increased the death benefit; (2) increased the compensation payable.

TEXAS: (1) increased the compensation payable; (2) provided for a second fund.

VERMONT: (1) increased the death benefit; (2) provided for a second injury fund.

VIRGINIA: (1) increased the compensation payable.

WISCONSIN: (1) increased the death benefit; (2) increased the compensation payable.

Occupational Diseases Legislation

INDIANA: (1) enacted an occupational disease law with compensation and benefits equal to those of the compensation act; (2) set up an exclusive schedule of occupational disease; (3) made the "last employer" responsible in silicosis cases, but gives him 60 days grace; (4) provides for an escalator scale beginning at $500.

IOWA: (1) enacted an occupational disease law with compensation and benefits equal to those of the compensation act; (2) set up a schedule of 16 occupational diseases; (3) made the "last employer" liable for silicosis cases but gives him 60 days grace; (4) provided for an escalator scale beginning at $500; (5) established a medical board of three physicians to act in an advisory capacity to the industrial commissioner.

MONTANA: created the State Commission for the Study of Occupational Diseases. This Commission is to make a detailed survey to determine the existence of occupational disease, hold public hearings, and submit a report of its findings and conclusions to the State Assembly in 1949.

NEVADA: (1) enacted an occupational disease law; (2) set up a schedule of 22 occupational diseases; (3) limited liability in silicosis cases to $5000 and precluded payment for partial disability in silicosis cases.

NEW HAMPSHIRE: (1) enacted occupational disease compensation statutes; (2) scheduled five compensable diseases or groups of diseases; (3) provided for escalator payments in silicosis cases; (4) required employees to submit to medical examination upon request and suspended compensation if the examination is refused; (5) provided that examination and testimony be given by an impartial physician.

NEW YORK: amended the occupational disease compensation law relating to silicosis and other dust diseases.

This amended law (1) provided for no compensation to be paid for partial disability; (2) provided for compensation to be paid for total disability or death in the same manner as provided for injuries by accident; (3) limited the payments by the employer to 260 weeks, after which the payments are assumed by the Special Disability Fund which is created and maintained through contributions by the employer in no-dependency fatal cases; (4) provided for a board of three medical consultants to whom all claims for silicosis or other dust diseases are referred for diagnosis, disability determination, etc.

SOUTH DAKOTA: enacted a new occupational disease disability law which (1) set up an exclusive schedule of 25 occupational diseases; (2) allowed no payments for partial disability; (3) may penalize an employer up to $1000 for discharging an employee because of non-disabling silicosis; (4) had an escalator provision.

This state also provided for the appointment of an advisory medical panel of three physicians selected from a list of nine supplied by the State Medical Association to determine controverted medical questions.

TENNESSEE: amended its compensation act (1) to include a schedule of nine occupational diseases; (2) to make compensation payable for partial disability, total disability, and death from occupational diseases in the manner as it is payable for injury by accident; (3) to permit an employee to waive in writing compensation for aggravation of his condition.

TEXAS: enacted an amendment to its compensation act which (1) sets up an exclusive schedule of 45 occupational diseases; (2) allows compensation for partial disability, total disability, and death; (3) limits the monetary liability; (4) contains an escalator provision in silicosis cases; (5) provides for appointment of an advisory committee of three physicians to examine claimants and report to the Compensation Board in controversial medical questions.

VERMONT: passed a House Joint Resolution which directed the Governor to appoint a committee of five to investigate working conditions in the state and to study the needs for covering occupational diseases by compensation laws and then to continue the study of existing occupational disease laws in other states.

No further conclusions as to the form of which law should be recommended for Vermont were reached.

Summary and Conclusions

Compensation payable was increased in 20 states.

Death benefits were increased in 12 states.

Nursing service was provided for in two states.

"Repetitive trauma" was made compensable in two states.

All medical limits were abolished in one state.

Safety programs were made compulsory in one state.

Medical limits were increased in four states.

Fee schedules were revised in one state.

Clerical workers were admitted to the act in one state.

Waivers for physical defect was admitted in one state.

Ambulance service was provided for in one state.

Hospital limits were increased in two states.

Officers of corporations were brought under the act in two states.

Second injury funds were enacted in six states.

Double indemnity for minors was provided for in two states.

Death benefit was made payable for cause other than injury in one state.

Payments for x-rays were allowable to roentgenologists, hospitals and laboratories in one state.

Loss of hearing due to trauma was made compensable in one state.

A commission was created to study the laws in one state.

A completely new and modern act was enacted in one state.

New occupational disease laws were passed in six states.

Benefits in occupational disease were made equal to injury benefits in four states.

Exclusive occupational disease schedules were set up in eight states.

"Last employer" was made responsible in silicosis cases in two states.

A 60 day grace period was established in silicosis cases in two states.

Escalator provision was set up in silicosis cases in four states.

Medical boards were set up in four states.

Total disability from silicosis cases was limited in two states.

No partial disability in silicosis was allowed in three states.

Medical examinations were required in one state.

A special disability fund was set up in silicosis cases in one state.

A penalty for discharging employees with non-disability silicosis was provided for in one state.

Waivers for aggravation were admitted in one state.

A commission was created for study of the occupational disease problem in one state.

Part Two: Unethical Medical Testimony

THE MINNESOTA PLAN: The so-called Minnesota Plan was formulated in 1940, at a joint meeting of a group of members of the Minnesota State Medical Association and another group of the Minnesota State Bar Association. The committee on Medical Testimony was appointed consisting of six physicians.

In addition to this Committee there are two parallel committees in the Bar and the Medical Associations which can be called upon to study questionable or borderline cases and recommend case dis-

missal or disciplinary action by the Medical Testimony Committee. Troublesome medical as well as legal questions are here carefully and effectively worked out.

Complaints are brought by physicians, attorneys and judges. All complaints are confidential to the chairman of the Committee and only he knows the name of the complainant. Investigations are made by the Committee with the assistance of an attorney to avoid legal entanglements.

The committee has the power to dismiss the case, to administer censure, or to refer to the State Board of Medical Examiners for punitive action.

A total of 13 investigations have been made. Three of these were serious enough to be referred to the State Board of Medical Examiners for severe action. Six cases were of such a nature that a single interview resulted in the desired correction. In four cases the charges were deemed unjustified and the cases dismissed.

Since 1945, there have been no complaints nor investigations.

The Committee is highly pleased with the results obtained, but it maintains a watchful attitude even though it has been more or less inactive during the past two years.

THE ILLINOIS PLAN: The Minnesota Plan was adopted in a somewhat modified form in Illinois in 1945. Representatives of the Chicago Medical Society conferred with the Committee on Ethics of the Chicago Bar Association. The committee on Medical Testimony of the Chicago Medical Society was appointed.

This Committee consists of four physicians; an internist, a surgeon, a radiologist, and a neuropsychiatrist. Activity is not limited to Chicago, however, but with the approval and cooperation of the Illinois State Medical Association cases in other important localities are handled.

Complaints may be entertained from any reliable source—judges, attorneys, physicians, one or the other of the litigants involved, etc. Upon complaint, verbal or in writing, to any member of the Committee, the trial record is reviewed by one member, and if the case deserves further attention then the Committee takes formal action. Reprimands are made by the Committee, but for punitive action the case is referred to the State Board of Medical Examiners.

Five complaints have been brought in 1946 and 1947. Four of these were from Chicago; one from Springfield. All cases involved testimony given in civil courts, before juries. No complaints have as yet been received arising out of cases before the Industrial Commission.

Four cases have been "satisfactorily disposed of" in the words of the Committee. In one of these, the testifier involved decided voluntarily to refrain from giving testimony in the future. The fifth case involves a habitual offender, and was "pretty roughly handled," in the words of one of the Committee members. Final decision has not yet been arrived at.

The Committee anticipates complaints arising out of Industrial Commission hearings, either in Chicago or in other cities.

OTHER STATES: No other states are known to have Committees on Medical Testimony at this time. However, there is some evidence that Michigan and Maryland are giving some consideration at this time to the establishment of such committees.

APPRAISAL OF THE MINNESOTA AND ILLINOIS COMMITTEES: Those physicians who hold themselves in constant readiness for expert medical testimony, and habitually hire themselves out to predatory attorneys are well known to all who are engaged in conducting trials. New ones appear from time to time. Most of these physicians have become aware of the Committee's influence, even though it may still be only in the background, and they have shown a tendency to considerable caution when testifying, and in some instances have refused to testify.

Further activity on the part of these Committees is bound to have telling results.

CONCLUSIONS: The pioneer work of the Minnesota Committee, emulated by the Illinois Committee, gives adequate proof that the concept of such a plan is sound. A committee appointed from the basic state or county medical society is representative of the profession in cross-section and, therefore, widely acceptable and fully effective.

The commendable cooperation of the legal profession gives strength and undergirding to the plans, and makes them work.

All state medical associations, where a medical testimony problem exists, can profitably study these plans and proceed along the same lines toward an effective remedy in their own states.

Part Three: Rehabilitation of the Handicapped

VOCATIONAL rehabilitation marches on. Interest in this subject received a major boost by a pamphlet published in 1944: "A Plan to Help You Employ Disabled Veterans and Other Handicapped Persons Productively and Safely." Of the full form of this booklet more than 150,000 copies have been used, not only in our own country but in Canada, Australia, South Africa and Scotland. Of a smaller, somewhat condensed form more than 118,000 copies have been distributed.

Further support of importance in regard to promoting the program were the numerous pamphlets and reports furnished by the Office of Vocational Rehabilitation of the Federal Security Agency.

Also two moving picture films, (1) "No Help Wanted," and (2) "Comeback," were produced and enthusiastically received and applauded.

With all of this promotion and fanfare there is still apparently a certain reluctance on the part of the handicapped themselves to make full use of these opportunities, and thereafter to enter wholeheartedly into the more or less active competition of a job which is general in industry. There is still a growing need for at least 1,500,000 persons of working age to avail themselves of these rehabilitation services. At the same time the number who need, but fail to receive, these services is increasing each year.

In the year 1946, (the last year for which dependable figures are available at this time) there were registered 267,048 disabled persons at various rehabilitation agencies, which is a considerable decrease from 1945. Of these, only 8.8% were Workmen's Compensation laws, in the various states. It would seem that the program is not fully effective at this time.

Part IV: Minor Developments and Trends

THE proceedings of the 32nd annual convention of the International Association of Industrial Accident Boards and Commissions have appeared in

print under the title, "Discussion of Industrial Accidents and Diseases," issued by the United States Department of Labor. There are 20 excellent papers devoted to all the various aspects of Workmen's Compensation.

Fortune Magazine has made a survey of United States factory workers. This showed a worker who (1) was dispirited, resigned and frustrated; (2) found his job boring; (3) did not think the pace of his job too slow, nor too fast; (4) found no opportunity in his job for personal initiative; (5) had little belief in the security of his old age; (6) would find a different occupation if he could; (7) wanted more hope for individual and personal advancement; (8) looked upon cafeterias, shiny washrooms and bowling teams as outmoded; (9) desired recognition of his honest efforts more than seniority, shorter hours and bigger pay.

Members of unions, especially the C.I.O. were more dissatisfied with their lot than non-union workers.

A study of lost-time accidents showed that the total cost was slightly above $100 for each accident. This includes medical service, safety investigations, reports of all kinds, damage to machines and property, time lost or spent in investigation, training of substitute personnel, production loss, and decreased efficiency after return to work. It does not include hospital costs, compensation paid, ambulance service, trusses and fees paid lawyers.

A Tennessee court decided that a worker who was drawing compensation and exhibited symptoms of syphilis, but refused examination to prove diagnosis, when requested by his employer, was unreasonable, and thereupon suspended his right to further compensation.

Studies have been made and published on the poisonous effects of cadmium mustard gas in prolonged exposure to small concentrations, mitric acid fumes, and selenium.

Experience with BAL (British Anti-Lewisite) has been published demonstrating its usefulness as a therapeutic agent in poisoning by lead and other metals, principally mercury and arsenic.

In Massachusetts a worker was paralyzed from fright when lightning struck the building he was working in. The court found the condition compensable.

The Supreme Court of New York found that a typist had actually developed an occupational disease as the result of using her hands continually in operating a typewriter and an adding machine. The disease was described as "ganglion of the dorsum of the hand."

—Workmen's Compensation Committee
J. DANIEL WILLEMS, M.D., Chairman,
JOHN N. SHIRLEY, M.D.,
CARL T. OLSON, M.D.

LETTERS

TO THE EDITOR: The Training of Technicians for Work in Industrial Physical Rehabilitation (An answer to some objections): Several months ago, we sent reprints of our note on "The Training of Technicians—For Work in Industrial Physical Rehabilitation"* to all deans of medical schools which had courses in physical and/or occupational therapy, and to the heads of all such university departments, asking them to give us their opinion on the subject.

We have received a number of letters from what seems to be the group most actively interested in this problem, most fully aware of it. In this short note we want to comment on their objections to our ideas.

Almost unanimously these experts agree not only that there is such a problem as the training of technicians for work in industrial physical rehabilitation but that its solution lies more or less along the lines proposed in our paper. As a matter of fact, we find from these letters that others have already expressed the same point, that something very close to the proposed solution was done during the war, that one specialist is already "trying to do exactly" what we have mentioned, and that several use physical and occupational therapists interchangeably. The others "agree in essence," feel this is "the coming thing," that these ideas "have a great deal of merit," that we "make a very good point," that they are "in accord with the ideas expressed." Others agree that "there should be closer correlation between work in physical and occupational therapy," "that there should be common courses," and that "physical and occupational therapy should be closely integrated."

All these distinguished specialists in the field of physical rehabilitation are then fundamentally in agreement.

Let us now examine the few objections which are raised by some of them. On the ground that we are not thinking only of P.R., that our problem here is not fundamentally different from that in the Continent, that perhaps here we are rather ahead of the times, and that special circumstances may permit us to do original work and to lead the way, we may dispose of the following suggestion: "I would suggest that the only answer is for you to begin in P.R. what was begun in the U. S. 25 years ago—a two-year school for technicians, which could increase in curriculum length as time permits and the need demands. After all, the problem in P. R. is different from what it is on the main land and I think should be met to meet your needs."

We agree of course that the problem "requires careful study," that "training in occupational therapy is now almost purely theoretical" *(that is one of the defects we criticize)*, that "we have a lack of training centers." But we do not think the problem is so difficult. It is just a question of doing what must be done in a progressive country where rehabilitation work is gathering so much momentum and where industrial medicine is every day increasingly important.

That "it would be very difficult to alter the established customs with regard to training of technical personnel" and that "the training program for occupational therapists is standardized by the A.M.A. and the American Occupational Therapy Association," are not really objections to our ideas, but a recognition of the difficulties that may lie ahead. The point to be raised is that difficulties should not deter us if we are convinced that there is a

*ARANA SOTO, S., "The Training of Technicians For Work in Industrial Physical Rehabilitation." INDUSTRIAL MEDICINE, 16:5, 236, May, 1947.

problem and that there is a solution which is to benefit the industrial patient and rehabilitation in general.

There is nevertheless one objection which carries more weight. It is raised by two of our correspondents. One says: "Most educators seem to feel that they must not only continue with general aspects of education but in addition seem to want to rid themselves of as much specialization as possible. They feel specialization in techniques should be the province of the post-graduate." Another says: "However, I would like to take issue with you on one point that you made in your article—namely, that of students deciding upon their fields of specialization early in their undergraduate work. From what I have seen of students and their abilities, they are not ready to do this until they are almost ready to graduate; some not even then. At the national convention of occupational therapists held early last month, the general feeling was that specialization came after graduation."

We do not think it would be too much to expect a candidate to decide early in her studies whether she is going to work in industrial physical rehabilitation rather than in a tuberculosis hospital or in an insane asylum. On the contrary, it is rather too much to expect industrial physical rehabilitation to employ at least two different kinds of technicians, who have much useless training, to have two different departments with two different chief technicians, all of which unnecessarily complicates our work. *The real point is that when we prepare our technicians we do not think enough, if at all, of the industrial patient* but we think only of the T.B. and the mental patient. This is so because T.B. and mental hospitals have existed for a very long time, and were the first to require rehabilitation and because we are not conscious of the enormous importance of the industrial patient and of industrial rehabilitation work, which is gathering so much momentum. This is a more recent problem but one which is at least as important in quality and certainly more so in quantity. We have in Puerto Rico an insular psychiatric hospital with 1000 beds; we have 2000 beds for T.B. patients, but we have *several hundred thousand insured workmen* and we already treat *several thousand cases* a year in our rehabilitation clinic. This should be enough to prove the quantitative aspect of the problem. And as for other aspects, is not the health of the industrial case at least as important as that of any other patient?

If for any reason the candidate decided to change her field of interest, she could easily take the required work in the new field. Our goal is to have all courses in rehabilitation given in the same school, so that it would be easy to add courses or to change courses if necessary. The work to be taken in a new field should be short if the technician had already finished her work in industrial physical rehabilitation.

We could easily evade the issue of early specialization by just saying that, in industrial physical rehabilitation, we need the appropriate technicians, that this work is so important by itself and that in the near future we are going to need so many technicians, that right now we need schools where technicians with knowledge in physical and occupational therapy and with experience in handling industrial casualties are trained. Our case here in P. R. is typical of what is happening and what will happen more and more acutely from now on. When we started our work, not only could we not get the required technicians but not even physical and occupational therapists. We have sent some 15 candidates to the Continent, some for training in occupational therapy, others in physical therapy and we had, against our will, to organize two separate departments, with two chief technicians, etc. Thus we could not avoid duplicity and unnecessary complexity in the organization of this Clinic. We will have good technicians in each of the two separate fields, but not so good in precisely the kind of work they are intended to do. As one of our correspondents admits, their training, particularly in O. T., will have been almost entirely theoretical and each will be unfamiliar with work in the other field.

Perhaps it is not right to call early specialization the choice by the candidate of her field of work. Besides, in many cases as in our Clinic, the student is sent precisely for training for work in industrial cases, so that the choice (early choice, but not early specialization) is already made. I should reserve the term specialization (which then should be "in the province of the post-graduate,") to the decision to pursue further study in O. T., or P. T., etc.

If any candidate later decides to work with mental, or T.B. cases, she takes the necessary courses, which would require in this case, not so much additional effort. At any rate the consensus of opinion of our correspondents indicates clearly that we are facing a problem the solution of which is imperative, that the adoption of a solution more or less along the proposed lines is only a question of time, that the sooner we face it squarely the better for the progress of industrial physical rehabilitation, for the rehabilitation of workmen and for the progress of a nation which so much depends on them.

We wish to express our sincere gratitude to those persons who were kind enough to give this problem a thought and to help us with their ideas.

—S. ARANA SOTO, M.S., M.D.,
Director Physical Rehabilitation Clinic, State Insurance Fund, San Juan, P. R.

NEWS, COMMENT and OPINION

Canadian Meeting

GUEST speakers at the 75th Annual Meeting of the Canadian Medical Association held at the Royal York Hotel, Toronto, Ontario, June 21-25, included DR. FRANK B. WALSH, Baltimore, on "Myasthenia Gravis"; DR. PHILLIP S. HENCH, Rochester, Minnesota, (subject to be announced); and DR. C. O. SAPPINGTON, Chicago, "Modern Methods of Health Protection in Industry" (general session), and "Prevailing Practices in Industrial Health Programs" (industrial medical section). These three physicians were also the official representatives of the American Medical Association at the meeting.

Airport Medical Office

LOS ANGELES, California, has established a fully equipped medical office at its air terminal and now provides emergency treatment for passengers 24 hours a day. The office, said to be the first of its kind at an airport, includes facilities for minor surgery, physical therapy, and diathermy. It serves also as an industrial medicine center for airline employees. —*Medical Economics*, May, 1948.

Mind vs Body

IN MY experience I have seen more loss of production from unhealthy minds than I have from unhealthy bodies," Dr. Harold M. Harison, medical director of George Weston Limited, Toronto, said at a conference on administrative practices held in the Cleveland Auditorium by Eighth Annual Congress on Industrial Health of the American Medical Association.

—News Release, American Medical Association.

Successful Course

THE Fifth Post-graduate Course in Industrial Medicine, at Long Island College of Medicine, Brooklyn, which began on April 5, was successfully completed on April 16. The total enrollment of full and part time students was 75, the second largest of all the college's post-graduate courses in this field. Thirty-one of the matriculants were physicians, 26 were nurses and 18 were members of other professions. Students from three foreign countries, Belgium, China and Egypt, also were present. Representatives of 26 different organizations in six different states attended the course.

Federal Sick Leave Abuse

DR. R. LOMAX WELLS, medical director of the Chesapeake & Potomac Telephone Co., Washington, said that of 500,500,000 man days lost each year in industry through illness, only 500,000 man days were lost through occupational illness and that the rest resulted from non-occupational sickness. Speaking at a conference on medical administrative problems in commerce and industry, he singled out for special comment the sick leave absenteeism among Federal employees. He said that in a nine-month study, 73% of all Federal employees used up the total of their sick leave privileges. In some departments, he said, 100% of the employees "abused their leave privileges." He pointed out that much of the sick leave was used before or after week ends or on long holidays. In an earlier address DR. LEONARD J. GOLDWATER, professor of industrial hygiene at Columbia University, charged that the American Medical Association had not shown leadership in industrial medicine. He said: "If AMA's statements about industrial medicine were carried out it would only retard the program. The AMA has made statements that industrial physicians are not supposed to treat workers, but nobody pays any attention to this because they do treat them." The conference was sponsored by the Schools of Business, Engineering and Public Health at Columbia University.

—*New York World Telegram*, May 5, 1948.

Federal Standards

THE ONLY Federal statute which fixes safety and health standards for manufacturing industries is the Public Contracts Act, which requires that goods supplied on a government contract be manufactured or furnished under safe and sanitary working conditions. —*New York Courier Trade Union*, May 3, 1948.

Deaths and Injuries

A RECORD post-war toll of 17,000 deaths and 2,000,000 injuries as the result of industrial accidents in 1947 has proved so alarming that the United States Department of Labor, at the request of President Truman, is starting a nation-wide "Operations Safety" program. Job injuries in the last year, the Labor Department said, cost American industry and workers a total of $3,750,000,000, with the wage loss to workers exceeding workmen's compensation benefits totaling $1,500,000,000. Director William L. Connolly of the Bureau of Labor Standards, who is heading the safety campaign, pointed out that one industrial worker was injured every second in the day. He said the accident reduction drive would be concentrated in smaller plants because it was in those establishments, which employ only a few workers, that 70% of the job injuries occurred. —*New York Times*, May 16, 1948

Sickness Absenteeism

A RECENT study of 565 plants with 500 or fewer workers (in which category, incidentally, some 90% of all U. S. plants fall) turned up these facts: 75% did not maintain absentee records, 86% did not provide sick benefit plans, 88% did not undertake health education, 96% did not give preemployment examinations, 97% did not provide for annual physical examinations, 99% did not provide chest x-rays, 99% did not give blood tests for syphilis, 99% did not have nursing care available. These figures, which are probably representative, indicate that a large majority of plants fail to provide a minimum of medical attention. Yet on-the-job medical care, it has been shown, reduces sickness absenteeism up to 60%. A health program providing all of the services listed above enabled one New York firm to cut absenteeism to half. The program cost $400,000, but in the long run it actually saved $1,500,000 in lost time, to show a net profit annually of $1,100,000. Reports from 1,625 companies indicate that health programs accomplished an average annual saving of $30,510 for concerns employing 500 or less.

—From "Industry's Worst Enemy—Sickness," in *Commerce*, Chicago, March, 1948.

Industrial Hygiene Foundation

THE TRUSTEES of Industrial Hygiene Foundation have fixed the dates for the 13th annual meeting of Foundation members, as follows: The meeting will be held at Mellon Institute, Pittsburgh, on Thursday, November 18. The main meeting is for management representatives, officers and department heads of member companies. Four round-table professional conferences will be held on November 17 and 19, the day before and the day after the meeting. These conferences are (1) for physicians; (2) for engineers; (3) for chemists and toxicologists; and (4) for attorneys, compensation officials, personnel and industrial relations men. Details concerning the meeting and the conferences will be sent in the fall and company representations designated at that time. Suggestions for program material for the main meeting would be helpful and appreciated.

Medical Panel

THE newly organized Medical Panel of the International Air Transport Association (IATA) held its first meeting in Toronto during the 19th annual meeting of the Aero Medical Association, June 16, 17 and 18. The ITA Medical Panel met with SIR WILLIAM P. HILDRED, Director General of IATA, to discuss its terms of reference and survey medical problems now under active consideration by the airlines. Set up by IATA to deal with all medical aspects of international airline operations, the Panel is composed of leading physicians nominated by IATA member companies. DR. FRANCIS N. KIMBALL, of New York City, long identified with aviation and now consulting medical officer to a number of United States airlines, is acting secretary.

Scientific Jargon

HEALTH physics is a new science organized for the purpose of studying atomic radiation health problems, and developing instruments and techniques to protect persons from radiation exposure. For example, two of the best electronic instruments available for measuring alpha, beta, and gamma radiation are the slangily named *Zeus* and *Cutie Pie*. *Zeus* is a two-tube balanced circuit. A feed-back tube was added to this balanced circuit to convert it into another useful meter called *Zeuto*. *Cutie Pie* which resembles a large pistol, is especially useful for reading the radiation behind the lead shields in a hood. When high levels of radiation are to be measured, however, the fish-pole meter that is fastened on the end of a long rod is used. A proportional *Poppy* is one of the most useful alpha survey instruments available. It uses probes of many different sizes, ranging from one small enough to be placed in a man's nostril to one with a foot of useful area for laundry monitoring.

—DR. KARL Z. MORGAN, Director of Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, *Modern Industry*, May 15, 1948.

No Time for Panic

MANAGEMENT men are doing business with a figurative cocked ear for the bell that will signal another wartime rat-race with all its confusion and controls. Alarmist speeches, headlines on the removal of military tools and planes from mothballs, and predictions of gigantic defense-lend-lease expenditures and emergency controls—all part of today's open diplomacy and war-by-headline—have made war jitters America's latest occupational disease. Industrial planners, by no means immune to the malady, are hard put to make decisions amid this hysteria and half-truths. Their attitudes, further, have a far-reaching effect for good or ill on customers, employees, and the community. They sense that there are steps that they should take to get ready for the eventuality of a war, however remote. There are steps that a patriotic and foresighted company can and should take; but equally important are things such a company should not do: First, there is neither reason nor excuse for panic, nor for the adoption of a *what's the use* attitude toward normal peacetime production and its problems. Taking into account the international situation, but stripping its domestic consequences of surmise and propaganda, the facts for the businessman are: (1) No top official in Washington, as queried by *Modern Industry*, considers war with Russia now as anything but the remotest of possibilities. (2) Defense preparations as currently scheduled, including the probable limited draft and the increased plane funds, will take up much of the expected slack in supply of materials and manpower. But they will not bring wide curtailment of production and drastic government controls. This also goes for ERP commitments which, in fact, will loom smaller in 1948 than did 1947 exports. (3) Large expansion of arms expenditures—which seems less likely on the heels of the Italian election returns and in a U. S. election year—will be adequately signaled by administration request and legislative action. No *secret* war funds are in existence to toss into material orders overnight. Businessmen who watch the course of future defense appropriations will be well guarded against any sudden shifts in the nature of U. S. production. (4) Aside from ethics, there is no point in hoarding materials or manpower against a turn to war production. In an all-out effort, they will just be taken away unless turned to war uses. Avoiding panic does not mean inaction. Farsighted management will (1) give freely of the talents of their best men in working out the industrial mobilization in the planning stage; (2) regularly dust off emergency plans to attract and keep scarce manpower; (3) plan for materials' substitution and product standardization in case of broader defense demands; (4) decide how plants can best fit into war production if necessary; and (5) cooperate with military procurement on educational orders. All these steps will pay—pay the company and country. But management's chief responsibility is to do the best job possible of normal production, to continue to cut costs, modernize, and build sales. Our greatest asset is a strong democratic economy. If management continues to make it work and make it more more smoothly, the chances are better-than-even that this will be answer enough to the Russian challenge.

—Editorial, *Modern Industry*, May 15, 1948.

Modern Employer-Employee Relations

WATCHMAKING usually is dull work at best. It's precision work, and it's monotonous. Because high precision is required, good, intelligent workers are needed. Because it is monotonous, just such people don't like these jobs. But Bulova Watch Co., Woodside, New York, has made these requirements jibe by engineering into its plant an environment that gets mentally alert people to do deadly monotonous jobs. Applicants enter the plant through an office that is part good club and part Fifth Avenue bank. They are carefully screened through mech-

anical, aptitude, and psychological tests. (One out of 10 is hired.) Then they go to school in a quiet, unfactorylike environment where they learn the tasks for which they seem best qualified. Indoctrination training goes on at the same time—a history of the company and of the industry taught through exhibits of the watchmaking art. In the plant itself they find music, workbenches and chairs designed for comfort, scientific application of color, good lighting, noise and vibration control. Production goals are constantly before them through bulletin boards. They have topnotch medical care. And for lunch and recreation periods, as well as after work hours, there are the eating and recreational facilities provided by the Swiss chalets—colorful and artistically decorated—in a separate building apart from the industrial plant but reached through a small, well landscaped garden. To speed recruitment of workers, Bulova offers $10.00 for each new employee recruited and accepted through a present employee. If the new worker is still on the job after three months (that is the critical breaking-in period in the watchmaking industry) the recruiter gets another $25.00 The policy pays off because the recruiting employee, his eyes on that extra $25.00 bonus, is the management's best aide in indoctrinating and training the novice.

—*Modern Industry*, May 15, 1948.

Million Dollar Medical Center

A ONE MILLION dollar medical center will be established in Manhattan for the 60,000 local member of the Amalgamated Clothing Workers (CIO). Expected to begin operations within three months, the center will provide free medical service on an annual operating budget of $500,000. Funds are being provided by the city's 400 men's clothing manufacturers who are members of the New York Clothing Manufacturing Exchange. The new project, which will be located in the heart of the men's clothing district between 14th and 23rd Sts., will supplement the surgical, maternity and hospital benefits ACW members receive under their industry-wide health insurance program. It will be jointly administered by the employers and the union.

—*Bronx Home News*, New York, N. Y., May 10, 1948.

Compulsory Health Insurance

WHAT is perhaps the strongest indictment yet made of national compulsory health insurance is found in a study made by the Brookings Institution. The study was undertaken at the request of Senator H. Alexander Smith, Chairman of the Senate Labor Subcommittee on Health. In its conclusion, the Institution points to the main basic faults in the proposal. (1) In its opinion, compulsory health insurance would necessitate a high degree of governmental control over the personnel and agencies engaged in providing medical care. It is extremely doubtful if politics could be eliminated from so vast a bureaucracy. (2) The plan would inject the government into the relationship between practitioner and patient. There is a real danger that this would impair that relationship and hence lower the quality of medical care. (3) The plan would actually increase the cost of medical care because of administrative overhead, the tendency of insured people to make unnecessary demands for treatment—on the grounds that they'd paid for it—and the possibility that some practitioners would take advantage of the system for their own financial advantage. (4) The Institution points out, many of the needy for whom the plan is supposed to be designed would "lack the means to attain and maintain an insured status." The Brookings Institution has a deserved reputation for objective, factual reports on many important issues. Its finding in the case of compulsory health insurance should be given the widest study and attention.

—*Industrial News Review*, quoted in *Jackson County Medical Society Weekly Bulletin*, June 5, 1948.

U. S. Healthiest Nation

CHEERING words on the state of this country's health were spoken in Denver by Dr. Joseph S. Lawrence, director of the Washington office of the Council on Medical Service, American Medical Association, who said your chances of being hospitalized this year are one in 11. Dr. Lawrence takes vigorous issue with those persons—notably supporters of the Wagner-Murray-Dingell bill—who picture the average American citizen as tottering on the brink of the grave for lack of medical care. According to a recent survey by the Brookings Institution, Dr. Lawrence said, this is the healthiest nation in the world. Many publicized statistics on draft rejections in the last war, he said, give a distorted picture of health facts. "Of those rejected, nearly 700,000 were rejected because they were illiterate," the physician said. "If a man was rejected by the Army, the Navy and the Marines, it was listed as three rejections, though it was only one man. Some men were rejected for such causes as punctured ear drums. A punctured ear drum is the result of good medical care to avoid a mastoid infection, not bad medical care." Many men rejected, he said—such as those who had had rheumatic fever, amputees, and others—were alive to be rejected only because they had benefited from excellent medical care. Dr. Lawrence opposed the Wagner-Murray-Dingell provisions for a compulsory system of medical care. "A lot of people have the idea this bill would mean that everyone got medical care," he said. "In fact, the bill has an eligibility clause which provides that only people covered by social security would be covered for medical care."

—*Rocky Mountain News*, Denver, Colorado, May 19, 1948.

Georgia Course in Industrial Hygiene

GEORGIA School of Technology will again offer in 1948 a summer course in industrial hygiene, similar to the successful one held last summer. The U. S. Public Health Service is again serving as a co-sponsor and providing facilities, equipment and personnel for the field-training part of the course. In order to provide individualized instruction to each student, enrollment is limited to approximately 20 students. The length of the course will be 12 weeks, June 28 to September 11. Work in course, to be offered on the Georgia Tech campus under the supervision of the Department of Civil Engineering, will consist of five graduate level courses, credit for which may be accepted toward an advanced degree for students with the necessary qualifications. Field training, consisting of participation in actual industrial problems under the supervision of the U.S.P.H.S. Communicable Disease Center, will cover all aspects of industry. Included on the staff are Dr. W. E. Doyle and H. L. Seifert, U.S.P.H.S.; Dr. Trawick Stubbs, Emory University; H. A. Wyckoff, Public Health Department, G. W. Reid, Civil Engineering Department, and J. M. Dalla Valle, Research Division, George School of Technology; and N. V. Hendricks, Standard Oil Development Corporation.

INDUSTRIAL MEDICINE

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Definitions

FLORIDA *Health Notes* (March, 1948), publication of the State Health Department, says: "Industrial hygiene is a specialized branch of public health work designed to protect the health of one special group, namely, working men and women, against hazards present in certain industrial environments." On a following page it says again: "Industrial hygiene is the care of the health of industrial employees, especially by the control and prevention of those ailments known as occupational diseases." Designating these for reference as No. 1 and No. 2, we can turn to No. 3:* "Industrial hygiene is a term which has expanded in meaning during several years of rapid development. Perhaps it is now outmoded when applied to one specialized program offered by public health agencies. Industrial hygiene is rapidly becoming one of the functions of general good health practice which must be integrated with several other health functions in order to affect the health and well-being of that segment of population with which it purports to deal. Today 400 professional persons in 58 states, territorial, or municipal health departments are engaged specifically in preventing disease and protecting the health of a labor force approximating 60 million persons. If consideration is given to the obvious in health practice (a focus of professional eyes on the health of the adult and the improvement of his living and working environment) then the number of professional personnel thus engaged must be increased manyfold. On this basis those working on preventable diseases and environmental sanitation contribute something worth while to the health of the worker, *per se*, as well as to his or her family. Thus, one might say that all health agencies are participants in a program of adult health. Such an approach establishes a segmentation of health work by age groups for directed emphasis. Then the practices employed are those applicable in accordance with the nature of the adult health problems arising in any community, group of communities, state, or nation. Eight years ago, W. Scott Johnson stated that it was essential to decide two points before the administrator could intelligently propose a program: (1) What does industrial hygiene include? (2) What is the nature and extent of the industrial hygiene problem? Mr. Johnson made no serious error when he answered the first question by saying that the preservation of the health and welfare of the worker in its broadest sense was rapidly being accepted as the scope of industrial hygiene. Certainly today this thesis has wide acceptance."

It is not to argue with these that they are cited, but merely to suggest the following:

No. 2 will inevitably experience the quotation of a portion of itself for the whole: "industrial hygiene is the care of the health of industrial employees." This will serve the purposes of those who want to play around with the meanings of "health." Others will use all of the definition, relying upon the connotations of the word "especially."

No. 1, while aimed in the same direction as No. 3, seems a little at variance with it: "Industrial hygiene is a specialized branch of public health work. . . ."; "perhaps it (the term 'industrial hygiene') is now outmoded when applied to one specialized program offered by public health agencies."

No. 3 is almost frank in expressing the *ultima Thule* to which the public health agencies aspire: ". . . .the preservation of the health and welfare of the worker in its broadest sense was rapidly being accepted as the scope of industrial hygiene. Certainly today this thesis has wide acceptance." In the background, of course, is the World Health Organization's definition of "health" as "the physical, mental and social well-being" of the individual.

*"The Pattern of Industrial Hygiene in the United States," by WILLIAM T. INGRAM, M.P.H., F.A.P.H.A., in *Am. J. Public Health*, April, 1948.

THE reachings-out of which expressions of this kind are evidence, have been predicated largely upon the effects on industry of non-occupational illnesses and disabilities. To whatever extent these can be reduced by such efforts, it may be—and no doubt it is—entirely fitting and proper "that all health agencies are participants in a program of adult health." But what *is* adult health? Whether it is all that is implied in the WHO definition of health, it certainly is more than freedom from illness. And, too, it is more than *sana mens in sana corpore,* even when *sana* is allowed to mean "sane" as well as "sound." Those who are presently concerned with the apparent inadequacies of safety techniques are profoundly convinced that there is something very much *non-sana* in the industrial accident situation (see page 20). And the non-industrial situation—on the highways, for example—is even worse. Accidents, in the main, whether in the plant or on the road, are adult effects from adult causes. They are an expression of some form of adult *unhealth.* Thus it would seem that if the public health agencies are to develop programs of adult health which will be more than job-sustaining activities they should not stop with its industrial hygiene implications but should go the whole way, and *take unto themselves the entire business of safety.* Many industrial concerns are excellent examples of the concept that industrial health is inclusive of industrial safety. Similarly, adult health embraces adult safety; and public health, public safety. This is a suggestion to those who will attend the President's Conference on Industrial Safety at Washington in September. Mindful of the fact that rules are made to be broken, and of the failure of prohibition to prohibit, the conferees can weigh the effectiveness of community health regulations, enforced by health officers, against the too-often futility of the usual campaign to get more employers to put more safety posters on more bulletin boards, and then get more employees to read them and heed them. Some agile mind may even develop a form of quarantine, to do what the most eloquent appeals to self-interest seem so often unable to accomplish.

MEANWHILE, getting back to definitions, it would be helpful if those who are framing them would follow the impersonal, unbiased, completely neutral methods of the standard dictionaries, where the descriptions are free from color and unburdened with wishful thinking.

Adopted Unanimously

RESOLUTION proposed by ALDUS C. HIGGINS (Chairman of the Executive Committee):

"The Directors of Norton Company, upon the final retirement of DR. W. IRVING CLARK on June 30, 1948, wish to record their gratitude and appreciation for his invaluable and devoted services to this company for 37 years.

"DR. CLARK was a pioneer in industrial medicine. Upon his connection with Norton Company as a distinguished surgeon, he made industrial medicine a specialty and by constructive and devoted work became recognized not only in his profession but also in industry as a leading authority in this country on industrial medicine, industrial hospitals, and industrial relations.

"The reputation of Norton Company in its employee relations, in its good working conditions, its safety record and in its interest in the employee personally, is largely due to DR. CLARK and his indefatigable efforts in behalf of all Norton folks.

"Many of us have benefited personally from his wise and learned counsel as well as by his unusual ability in diagnosis.

"As Professor of Industrial Medicine at Harvard College for 25 years, to 1944, and as the author of many papers on industrial and other medical subjects, he has an unusual reputation.

"DR. CLARK was due for retirement in 1944 but at the urgent request of this Board has continued until the present time for which the Board is grateful.

"The Board of Directors hereby record their great appreciation and gratitude to DR. CLARK for all that he has done for Norton Company and all Norton people. We wish him many years of happy life and endeavor as President of The Memorial Hospital which also owes much to his energy, wisdom and unselfish devotion."

THE foregoing resolution was received a few days after the announcement of DR. CLARK'S retirement which appears elsewhere in this issue (page 4). We hope in the near future to follow this tribute with another, equally deserved.

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And so will a lot of your patients. Cutter Dermesthetic Ointment can save them from losing their minds—or friends—or jobs. Because it gives prompt and lasting, *triple-action* relief from itching.

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This itch relief—added to the ointment's bacteriostatic action—also helps to avoid secondary infections from scratching.

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As an *immediate* solution—while the responsible irritant is under investigation—stop the itch with Cutter Dermesthetic Ointment. *Not* a *remedy,* but long-lasting topical relief, this greaseless ointment requires no bandaging, and permits the worker to continue on-the-job in comfort.

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For clinical test, a dispensary package of ten trial tubes of Dermesthetic Ointment is being mailed to physicians in active industrial practice.

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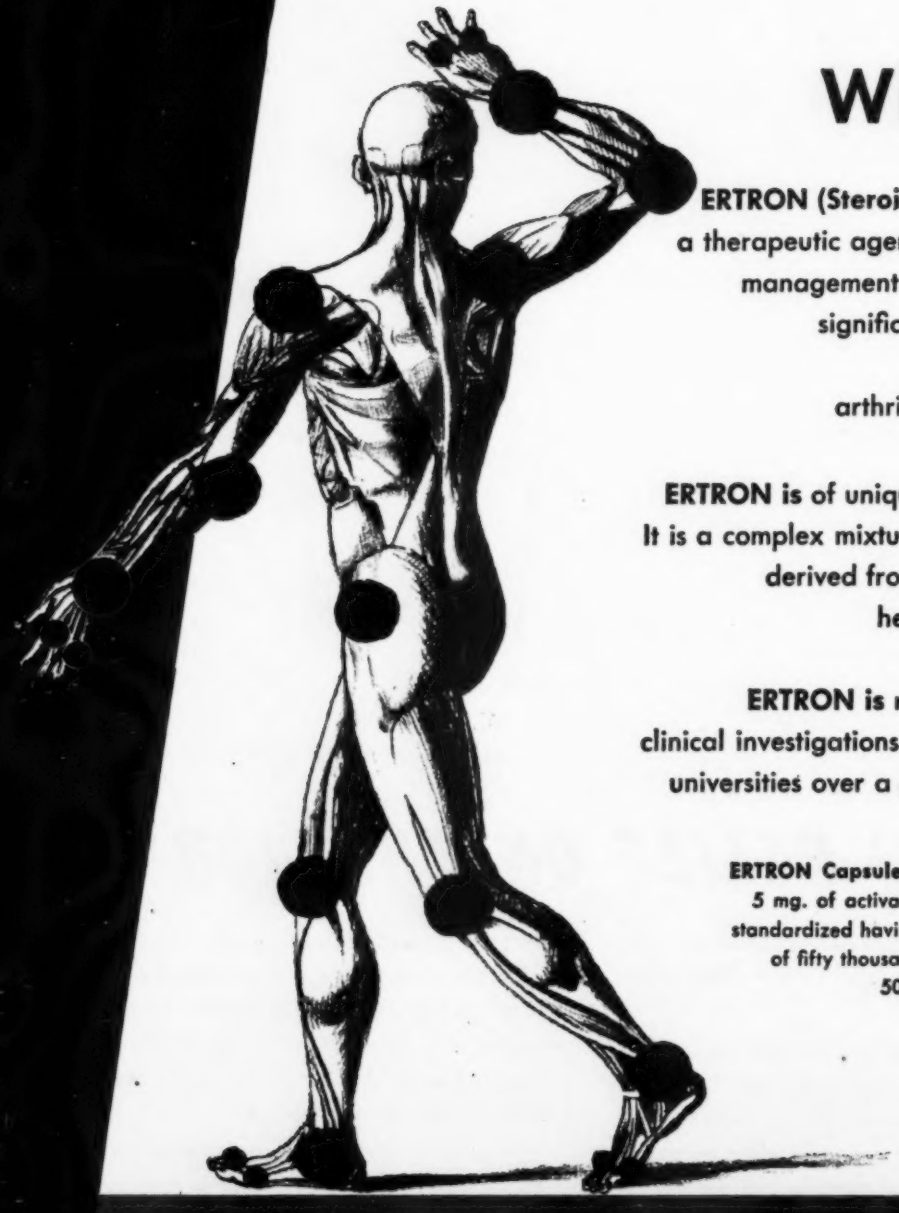

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THE MEDICAL DEPARTMENT OF NUTRITION RESEARCH LABORATORIES CORDIALLY

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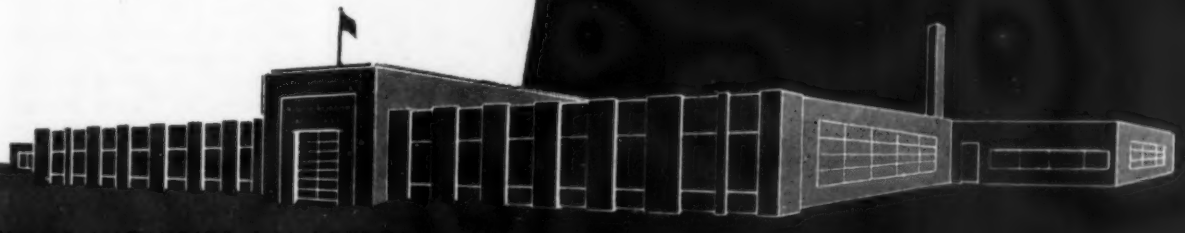

...TES YOUR INQUIRIES ON ERTRON...

INDUSTRIAL HEALTH and DISEASE

The National Industrial Safety Conference

THE story I want to call to your attention has to do with industrial accidents. Millions of people in this country don't have to worry about getting their hand out of a press punch in time to prevent it from being crushed, or dropping a casting on their foot, or slipping in a puddle of machine oil. Maybe they never get near punch presses, or castings, or puddles of oil on a factory floor, so the problem of industrial accidents seems remote. Actually it isn't because, even if they are never injured, they help foot the bills for other people's accidents. It's not an easy thing to dramatize and bring home to people because they very seldom realize the serious effects of an accident unless they see one or it happens to them, and then it's too late. The facts about industrial accidents are startling enough, but the problem is to get the story across to the American people. You can help, because you know how to dramatize a story and make it seem real and personal to the people who read your column. I wonder how many newspaper readers realize that one American worker is injured on the job every 16 seconds throughout the 24 hours of every day and the 365 days of the year? And that one worker is killed on the job every four minutes? Last year, work accidents injured 2,000,000 workers, killed 17,000 and disabled 91,000. Those who were injured suffered wage losses in excess of 1½ billion dollars over and above benefits which they received under workmen's compensation. Combined loss to labor and industry was 3½ billion dollars. Even those persons whose lives and homes were not directly touched by these accidents helped pay the bill because of this unnecessary drain on our productive manpower which is responsible for our national wealth and security. The amount of money lost in wages during 1947 by injured, crippled and killed workers is enough to feed, clothe and shelter a city almost as large as Detroit for one whole year. The 44,700,000 man-days lost through accidents could have produced more than 2,000,000,000 pounds of soap, 89 million shirts or 50 million pairs of shoes. While many private and governmental agencies are working in the field of industrial accident prevention and producing some success, President Truman believes that "a concentrated and coordinated effort" by everyone concerned can result in a practical, nation-wide program for reducing accidents. He asked the Department of Labor to call a national conference for this purpose and plans have advanced to the point where I can tell you that the

Q. DO YOU KNOW WHAT DERMATOLOGISTS DO *FIRST* IN TREATING ANY INFLAMMATORY CONDITION OF THE SKIN?

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...and thus are sure to do no harm *eliminating the danger of "overtreatment" dermatitis.*

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DOMEBORO TABS can aid you, doctor, in reducing absenteeism by promoting *faster healing* because DOMEBORO solution remains in a state of constant ionization, thus rendering it capable of *correcting* variations in the pH values of the skin.

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BUROW'S SOLUTION
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President's National Industrial Safety Conference will be held in Washington, September 21-23. Management, labor, state and Federal labor departments, and private groups such as the National Safety Council will be brought together to work out a cooperative program.

—From a letter by LEWIS SCHWELLENBACH, late Secretary of Labor, to VICTOR RIESEL, published in *Post & The Home News*, New York, June 11, 1948.

Bethlehem Laboratory

BETHLEHEM Steel Company has installed a new industrial hygiene laboratory to seek out and eliminate industrial hazards and to provide improved working conditions for employees in its plants. Most important among the functions of the laboratory is the control of atmospheric contaminants, which include dusts, fumes, smoke, mists, vapors and gases, says *Steel*. Other environmental problems of importance are proper heating or cooling, ventilation, illumination, noise abatement and protection against radiant energy. Three distinct phases are involved in the work of the industrial hygiene staff: (1) study of conditions and collection of samples, (2) analytical work in the laboratory and (3) determination of control and corrective measures.

Bethlehem's example could be followed with profit by many companies in the metal-working industries.

—*Derrick*, Oil City, Pennsylvania, June 15, 1948

Usual Course

LIKE most compulsory systems, the San Francisco Municipal Employees' Health Service System started out by promising too much for too little—in an attempt to stifle opposition to its compulsory payroll deduction features. And like most systems of socialized medicine, when financial difficulties developed, it first siphoned off funds needed for medical services to help defray the cost of bureaucratic overhead. When that failed to balance the books, the system increased its rates to insured members—and then took the final step, characteristic of all experiments in socialized medicine, by demanding that physicians lower the quality of medical and hospital care provided their patients.

Avocational Hazard

REHEARSAL of top-drawer New York orchestra blew up recently when all four clarinetists left to deliver babies; Doctors Orchestral Society (70 M.D. members) had to call it a day.

—*Medical Economics*, July, 1948.

DR. PILGRIM

NOW sending out between 40 and 50 announcements of the Ninth International Conference on Industrial Health to be held at London, September 13-17, these having been sent here for distribution. . . .AND attending the last concert of the season of the Chicago Business Men's Orchestra and, for the first time, sitting on the audience side of the footlights, enjoying greatly Beethoven's Overture Leonore, Sym-

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The External Cod-Liver Oil Therapy

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Wounds, Burns, Ulcers, especially of the Leg, Intertrigo, Eczema, Tropical Ulcer, also in the Care of Infants

Desitin Ointment contains Cod-Liver Oil, Zinc Oxide, Petrolatum, Lanum and Talcum. The Cod-Liver Oil, subjected to a special treatment which produces *stabilization* of the Vitamins A and D and of the unsaturated fatty acids, forms the active constituent of the Desitin Preparations. The first among cod-liver oil products to possess unlimited keeping qualities, Desitin, in its various combinations, has rapidly gained prominence in all parts of the globe.

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phony No. 5 in E Minor by Tschaikowsky, and a Concerto for harp and orchestra by Gliere. Meeting many of the old associates, including TALLEY, PRIEST, WOODS, VOIT, WESTRATE, HILLER, and others; and sitting for the first half with DR. GLENN GARDINER and the last half with MADAME PILGRIM. . . .AND now concerned with several different types of problems, including the protection of employees breaking up old material on a roof, observation of 32 serial films on an individual in which there was considerable difference of opinion as to differential diagnosis between tuberculosis and silicosis. . . .AND enroute again to central Indiana, and this time concerning administrative problems of setting up a health service for a small plant of about 70 employees, having conversations with the plant manager, the nurse and the two doctors who were serving the plant in a small town of 7000 population; and also concerned with x-ray films of the chest taken at the Memorial hospital which has a very excellent x-ray department and clinical laboratory. . . .AND then lunching with CHICK SANDER at the Palmer House previous to the Sunday afternoon meeting of the CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY, and seeing various men here, including DRS. GRAHAM, CALLAHAN, REEVE, GARDINER, KIRBY, SIDNEY WALKER, DAVIS, HAMLIN, HAMMOND, DRUECK, FIELD, WILLEMS, GEBHARD, HOLE, JANSEY, SLOBE, JACOBSON, JOHNS, and others. . . .AND now in conference on another problem of a downstate industrial organization and looking over various x-ray films of the chests of persons, and discussing the possibilities of these with one of the local physicians, in the meantime preparing a statement for one of the safety equipment manufacturers concerning a field test on a respiratory protective equipment some years before. . . .AND enroute to southern Indiana, where again appearing before an arbitration group and hearing evidence after visiting one of the sanitaria, with examination of one of the inmates and the viewing of serial films, there again seeming confusion as has been noticed on many other similar occasions concerning the differential diagnosis and the reaching of a sane diagnostic conclusion. . . .AND presiding at the usual monthly meeting of the Chicago Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION and listening with great interest to a discussion of industrial hygiene codes by MR. JOSEPH FLANAGAN; later discussing a supreme court decision which seems to have considerable possibility of confusing the uses of dust data in the future. . . .AND enroute to Purdue University for the purpose of giving a lecture on modern protective methods against industrial hazards, and contacting as usual PROFS. JOSEPH TIFFIN and ED WIRT, and also enjoying the hospitality of the REEDS, after which spending the night at Purdue Union, which is one of the best on the continent . . . .AND now reading with a great deal of interest a manuscript on "Occupational Incapacity," in which although quite idealistic, nevertheless there are many sound recommendations . . . . AND again busy at the desk in the consideration and writing and dictating of meeting proceedings, and recently in the study of an asbestos problem, involving the interpretation of x-ray films and a special examination . . . . AND MADAME PILGRIM off to Washington, Philadelphia and Atlantic City in observance of Memorial Day and also attending the Gold Star Mothers Convention, myself spending the Memorial week-end holidays with the GARDINER family at its menage in Oak Park. . . . AND still enjoying the Saturday and Sunday afternoon programs of the symphonies and the Saturday afternoon First Piano Quartette renditions, including the Dvorak Symphony in D, Brahm's 6th Hungarian Rhapsody, Chopin's Nocturne in E Flat, Saint Saens' The Swan, Mendelsohn's Scherzo from Midsummer Night's Dream, Haydn's 99th Symphony, Minuet in G by Beethoven, Tarentella No. 45 by Mendelsohn, and various other divertissments . . . . AND again at routine work and the periodic examinations of employees in various exposures, and finding that management is continually insisting on better criteria for early diagnostic use and indications of untoward effects . . . . AND having the great pleasure and

Hypodermic Needles ACE Bandages
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WHO'S WHO
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"INCREASINGLY VALUABLE FOR REFERENCE"
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privilege of welcoming two of my former college mates, not having seen them for 37 years, and taking them to the club for dinner, with many reminiscences with architect HAROLD CRAWFORD and MARY CRAWFORD, now on their way to M.I.T. for a 35th reunion ....AND noting on a theatre marquee the titles of two pictures which seemed rather apropos for these times: "This Time for Keeps"—"The Mating of Milly" .... AND planning for later meetings, including the meeting of the Canadian Medical Association during the latter part of June.

Advertisers Index

Abbott Laboratories....11
Thenylene Hydrochloride
A. S. Aloe Company....13
Aloetherm Short Wave Diathermy
American Sterilizer Company....25
Hospital Equipment
Bauer and Black....24
Tensor Elastic Bandage
Bausch and Lomb....27
Booklet: "Vision in Industry"
Baybank Pharmaceuticals, Inc. 15
Petrolatum Gauze Dressings
Becton, Dickinson and Company....22
B-D Products
Bilhuber-Knoll Corp. 26
Octin
Breck, John H., Inc. 29
Breck Water Resistant Cream
Bristol-Myers 32
Sal Hepatica
Carbisulphoil Company 28
Foille
Cereal Institute, Inc. 30
Breakfast Foods
Ciba Pharmaceutical Products, Inc. ....4th cover
Pyribenzamine
Color Test Co., Inc. 28
Plastic Discs
Cutter Laboratories....17
Dermesthetic Ointment
Denver Chemical Mfg. Co., Inc. ...26
Galatest Acetone Test
Desitin Chemical Company....21
Desitin Ointment
Dome Chemicals, Inc. 20
Domeboro Tabs
Eaton Laboratories, Inc. ....2nd cover
Furacin Soluble Dressing
Johnson and Johnson....1
Specialist Splints and Bandages
Keystone View Company....28
Occupational Tests
Thos. Leeming and Co., Inc. 2
Calmitol
Eli Lilly and Company....16
Surfacaine
Machlett Laboratories, Inc. 9
Dynamax "26"
Merck and Co., Ltd. 10
Pyridium
Philip Morris and Co., Ltd., Inc. ...31
Cigarettes
New York Pharmaceutical Company.28
Hayden's Viburnum Compound
Nutrition Research Laboratories.18, 19
Ertron
Parke, Davis and Company....7
Benadryl
Standard Pharmaceutical Co., Inc. 22
Presto Sol Tablets
Schenley Laboratories, Inc. 5
Titralac
Shield Laboratories 33
Riasol
Vodine Company 24
Vodisan and Vodust
West Disinfecting Company..3rd cover
Lan-O-Kleen Hand Cleanser
Willson Products, Inc. 23
Monogoggles
Winthrop-Stearns, Inc. 14
Creamalin
Wyeth, Inc. 12
Sopronol

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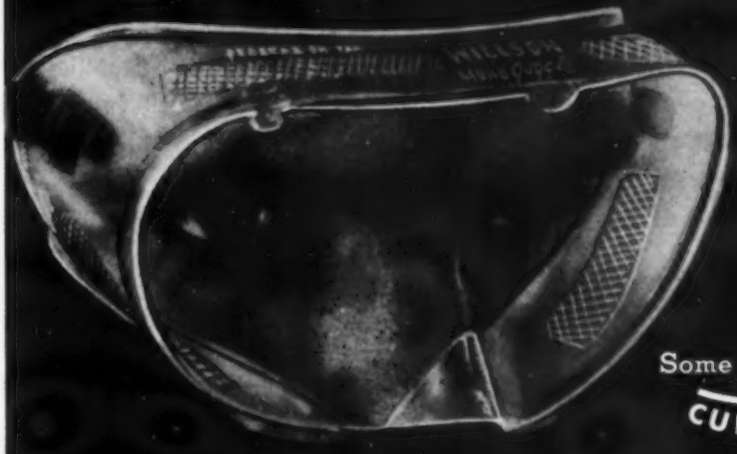

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- New drop-eye shape gives wider vision.
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The active ingredient of Vodisan and Vodust, Hycloromane (dihydroxydichlorodiphenylmethane), was first proven effective in the jungles of the South Pacific in combating fungous rot on cloth fabrics. Now *in vivo* and *in vitro* studies have proven it to be effective against fungous infections of the skin.

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Good Nutrition Should Start with Breakfast

The long fast from the evening meal to breakfast, and the demands of business and scholastic activities during the morning hours, require that an adequate breakfast be eaten. Yet a significant number of adults and teen age children fail to receive from one-fourth to one-third of their caloric and nutrient needs at breakfast, as recommended by nutrition authorities.

To aid in planning an adequate breakfast, a widely endorsed basic breakfast pattern has been employed. This pattern, consisting of fruit, cereal, milk, bread and butter, serves well as a nucleus around which the morning meal can be built. It is nutritionally sound, as evidenced in the table, and is outstanding in its economy; in the average community, it can be prepared at a cost of but 15 cents.

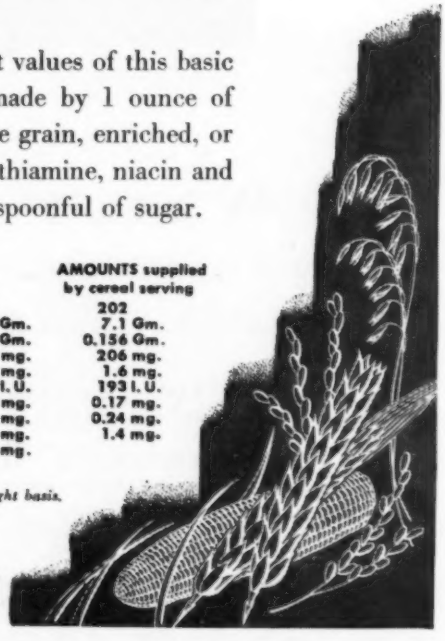
The cereal serving—comprised of hot or ready-to-eat breakfast cereal, milk, and sugar—is an attractive main dish of this meal, contributing excellent nutritional values, taste appeal, and variety.

The table indicates the nutrient values of this basic breakfast and the contribution made by 1 ounce of ready-to-eat or hot cereal* (whole grain, enriched, or restored to whole grain values of thiamine, niacin and iron), 4 ounces of milk and 1 teaspoonful of sugar.

The presence of this seal indicates that all nutritional statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

BASIC BREAKFAST	TOTALS supplied by Basic Breakfast		AMOUNTS supplied by cereal serving
Orange juice, 4 oz.;	CALORIES	611	202
Ready-to-eat or Hot Cereal, 1 oz.;	PROTEIN	20.7 Gm.	7.1 Gm.
Whole Milk, 4 oz.;	CALCIUM	0.465 Gm.	0.156 Gm.
Sugar, 1 teaspoon;	PHOSPHORUS	488 mg.	206 mg.
Toast (enriched, white), 2 slices;	IRON	3 mg.	1.6 mg.
Butter, 5 Gm. (about 1 teaspoon);	VITAMIN A	1074 I. U.	193 I. U.
Whole Milk, 8 oz.	THIAMINE	0.52 mg.	0.17 mg.
	RIBOFLAVIN	0.87 mg.	0.24 mg.
	NIACIN	2.3 mg.	1.4 mg.
	ASCORBIC ACID	64.8 mg.	

*Composite average of all breakfast cereals on dry weight basis.



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***Completely documented evidence on file.**

****Reprints on Request:**

Laryngoscope, Feb. 1935, Vol. XLV, No. 2, 149-154; Laryngoscope, Jan. 1937, Vol. XLVII, No. 1, 58-60; Proc. Soc. Exp. Biol. and Med., 1934, 32,241; N. Y. State Journ. Med., Vol. 35, 6-1-25, No. 11, 590-592.

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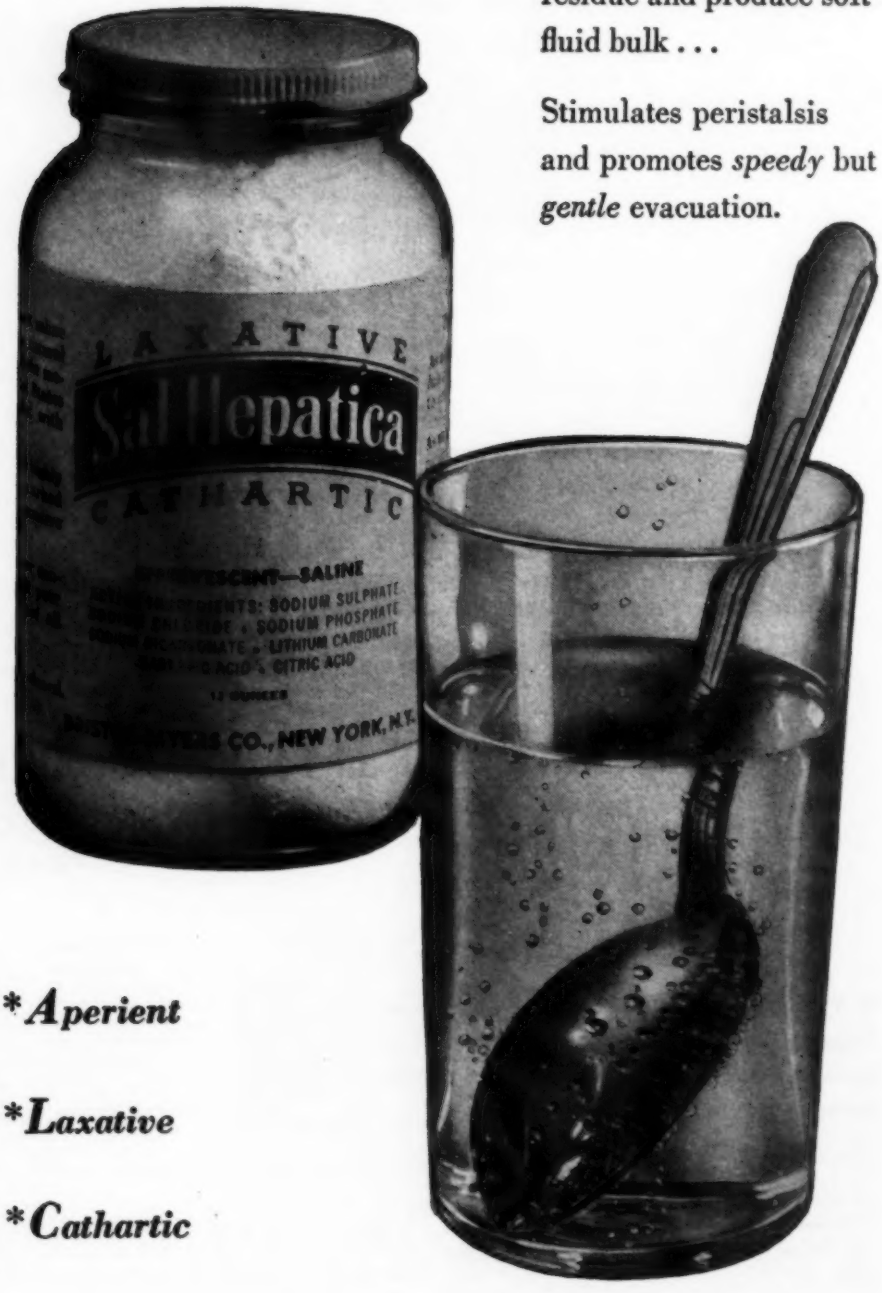

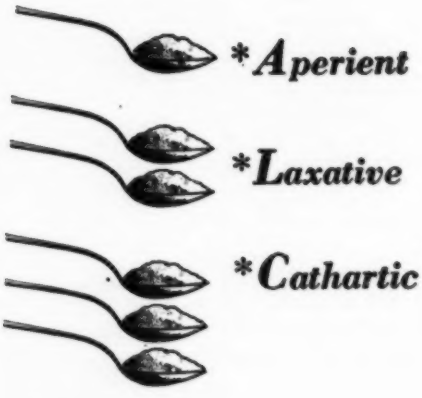

*Aperient

*Laxative

*Cathartic

*Average dose

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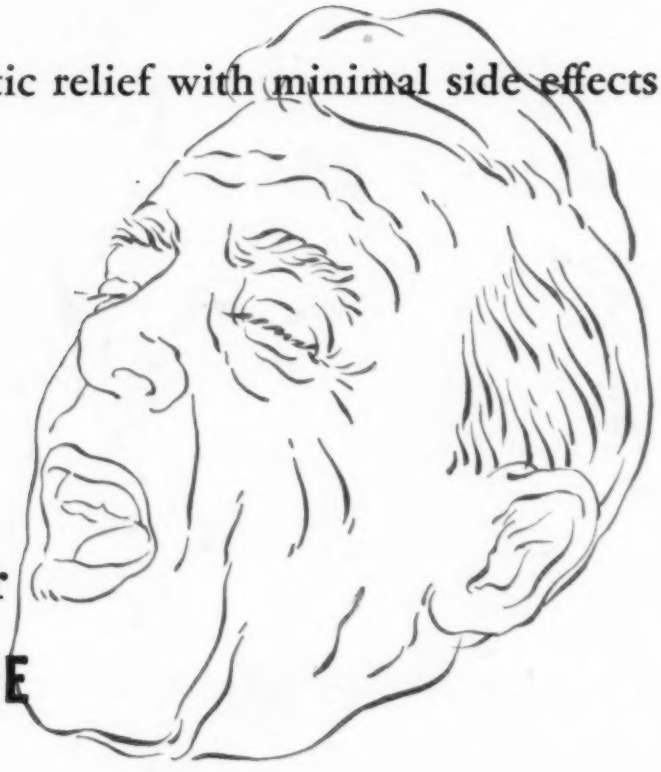

in
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1. Arbesman, C. E.: *N. Y. State Jl. of Med.*, 47: 1775, 1947.
2. Loveless, M. H.: *Am. Jl. of Med.*, 3: 296, 1947.
3. Bernstein, Rose and Feinberg: *Ill. Med. Jl.*, 92: 2, 1947.
4. Osborne, Jordon and Rausch: *Arch. of Derm. & Syph.*, 55: 318, 1947.

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